ANNALS
OF
OTOLOGY, RHINOLOGY
AND
LARYNGOLOGY.

VOL. XXV. DECEMBER, 1916. No. 4.

XLV.

CLINICAL PATHOLOGY OF TUBERCULOUS LARYNGITIS.

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In 1914 the writer[1] presented a paper on the Etiology and Prophylaxis of Tuberculous Laryngitis. It was then stated that an intensive study of laryngeal tuberculosis presented so many important aspects that its results could not possibly be detailed in one paper. It appeared to the writer that the subject could more profitably be discussed by dividing it into sections, and this communication will therefore be devoted to the study of the clinical pathology of laryngeal tuberculosis.

It can readily be seen that a thorough knowledge of clinical pathology is fundamental. Without a full conception of the various phases and course of a lesion, we are scientifically unable to prognosticate and treat a disease.

The prognosis of laryngeal tuberculosis, although not easily determined, depends on many influencing factors: the pul-

monary lesion, general condition of the patient, site and extent of the laryngeal lesion, early diagnosis, character of treatment, etc. To the author, however, it seems that one of the major influencing factors is the character of the lesion itself. Dr. Robert Levy[2] of Denver says: "The advent of laryngeal complication adds to the gravity of the prognosis. This statement applies only to those cases in which the nature of the complication is of the rapidly active type with marked edematous swelling and abundant tubercles." He further states that "in that form of laryngeal tuberculosis in which there is little or no tendency to ulceration, the form characterized by more or less firm infiltration, the progress of the general disease is not materially affected."

In the above quotation regarding the prognosis, the weight attached to the character of the lesion makes a strong impression; its importance could not possibly be exaggerated and is in accord with the author's views. In pulmonary tuberculosis one is immediately impressed by the difference in gravity between a case of acute tuberculosis and fibroid phthisis, because of the difference in pathology. Similarly in tuberculosis of the larynx, in addition to a consideration of all other factors, an attempt should be made at arriving at a prognosis by taking into account the pathology.

The author's experience has taught him to classify laryngeal tuberculosis as acute, subacute, and chronic.

THE ACUTE TYPE (Figures 7 and 12), the least frequent of the series, is characterized by a soft edema of the larynx with a marked tendency to ulceration. It may begin acutely or else follow the subacute or chronic type. It usually occurs in advanced pulmonary cases, often in moderately advanced, and occasionally in the incipient cases. There is little or no tendency to fibrosis, and it therefore takes an acute course. Nodules, consisting of tubercles, can often be seen projecting above the surface of the mucosa. When the tubercles caseate, they give rise to ulcers. During the stage of caseation the nodules often coalesce with the production of extensive ulcerations. The patient usually suffers from marked hoarseness or aphonia, sensation of fullness in throat and irritation with constant desire to cough and expectorate. Dysphagia is of common occurrence, and may be very pronounced, depending largely

on the location and character of the ulcerations. With the patient in good general condition it may run its course, become subacute and occasionally arrested, but in general the lesion is hardly amenable to treatment. As to prognosis, the life of the patient is generally from six to eighteen months. It is often a terminal condition in advanced pulmonary cases, especially in those that are overwhelmed by the toxins of the tubercle, and that have completely lost their acquired immunity to the disease. This is probably the type which the older writers had in mind when speaking of laryngeal tuberculosis as the "death warrant."

THE SUBACUTE TYPE (Figures 1, 2, 3, 4, 5, 6, 9, 10 and 13) is characterized by a pseudoedema of part or parts of the larynx with a moderate tendency to fibrosis. It may begin as such or else follow the acute or chronic type. It takes a subacute course, has a tendency to fibrosis, and is usually benefited by treatment. Papilliform infiltrates and soft polypoid excrescences usually belong to this type. The local symptoms may be slight or moderate, depending largely on the extent and site of the lesion. Hoarseness as a rule is present, particularly when the true vocal cords or the interarytenoid sulcus is involved. Dryness in the larynx is usually complained of, especially when the fibrosis is extensive. With the patient in good general condition it runs its course and may become completely arrested. The prognosis as to life and voice depends much on the patient's general condition and on an early diagnosis. With proper treatment the prognosis in the average subacute case is favorable.

THE CHRONIC TYPE (Figures 8 and 11), which offers the best outlook, is characterized by firm infiltration of part or parts of the larynx, with a marked tendency to fibrosis and healing. The lesion, due to an excessive proliferation of connective tissue cells, is usually limited in extent in the affected areas, and may remain so for an indefinite period. These patients suffer very little, and often, with the exception of occasional dryness in the throat and slight hoarseness, have no symptoms at all. For this reason this type is very often overlooked. The prognosis as to life and voice is very good, and unless it takes on a course of the acute or subacute type, will have very little influence on the pulmonary condition. The diagnosis of this

type, however, is of major importance. The patient should be told of the condition, so that the proper measures may be taken. Abuse of the larynx will often modify its course, while with proper attention this condition will usually remain secondary to the pulmonary lesion.

The three above described types, although one may follow or precede the other, are undoubtedly distinct, and it is highly essential to differentiate them on account of the bearing on prognosis and treatment. As a rule, more than one examination will be required to make the proper diagnosis and to determine the course of the disease.

The author has therefore observed and studied one hundred cases of laryngeal tuberculosis over a period of three months to two years, and has carefully noted the affected parts in detail. Only those cases that presented a laryngeal lesion without doubt, and only those that offered an opportunity for a complete examination, were included in this study. Otherwise the cases were not especially selected.

All cases were examined by indirect laryngoscopy. Where the character of the lesion was still in doubt after the examination with the ordinary mirror, a magnifying laryngoscope was used, thus eliminating possible errors.

The result of this study will now be given in detail.

SEX.

Sixty-four of the patients were males, while thirty-six were females. These figures do not express the comparative frequency of tuberculous laryngitis in the sexes. In past work the author found tuberculous laryngitis one and a half times as common in males as in females.

AGE.

Fourteen of the patients were between fifteen and twenty years of age, only one of these being fifteen, and the rest over eighteen. Fifty-three of the patients were between twenty-one and thirty. Twenty-one were between thirty-one and forty, while twelve were between forty-one and fifty. The majority of the patients, therefore, were between twenty and thirty years of age.

SPUTUM.

The sputum contained tubercle bacilli in all cases.

PULMONARY STAGE.*

Twelve of the patients were in the incipient stage, fifty-nine in the moderately advanced, and twenty-nine in the far advanced. As only about fifteen per cent of our cases are in the advanced stage, the reason for the apparently lesser frequency of laryngeal tuberculosis in the advanced cases is obvious.

LARYNGEAL STAGE.†

Sixty cases showed early involvement of the larynx, and were classified as stage one; thirty-three cases showed moderate involvement, and were classed as stage two; while seven cases had an advanced involvement of the larynx, and were put into stage three. The high percentage of early involvement shows the importance of examination of the larynx in all cases of pulmonary tuberculosis. If the larynx is examined only when the patient complains of marked symptoms, the probabilities are that the lesion has already passed its incipiency and is in an advanced stage. Symptoms are usually absent or very slight during the early stage of infiltration, and only by thorough search may early lesions be detected.

CLINICAL TYPES.

Nine of the cases were of the acute type, fifty-two of the subacute, and thirty-nine of the chronic. The low percentage of the acute type is partly due to the fact that only seven or eight per cent of all the cases in the sanatorium are bed patients.

EPIGLOTTIS.

The epiglottis was found clinically normal in sixteen of the cases, marked congestion was observed in forty-two, and although considered pathologic, was classified as such but not as clinically tuberculous. The author has no doubt that if microscopic sections were taken, at least some of these would be

*Pulmonary stages according to the Classification of the National Association for the Study and Prevention of Tuberculosis.

†Laryngeal lesions classified according to author's classification. Annals of Otology, Rhinology and Laryngology, December, 1914.

found tuberculous, although clinically they appeared to be catarrhal. Anemia of the epiglottis was present in fourteen cases, and here the author wishes to call attention to the apparent infrequency of anemia as compared with congestion. In most of these cases the anemia was only a local manifestation of the general anemia and not of any pathologic process per se. Slight infiltration was detected in twenty cases. Marked infiltration in three cases, while marked infiltration with single or multiple erosions was present in five cases. The site of the involvement was either at the rim of the epiglottis or else at the cushion. All the lesions were bilateral and more or less diffuse. Only one case presented an infiltration limited to the right side and to the lingual surface of the epiglottis. (Figure 6.) In two cases, with the exception of slight interarytenoid hyperplasia, the infiltration was limited to the epiglottis. Thus it is seen that clinically, of the one hundred cases examined, twenty-eight showed an involvement of the epiglottis.

INTERARYTENOID SPACE.

The interarytenoid sulcus was found clinically negative in five cases. Four cases showed a congestion. Slight infiltration was observed in forty-one cases, while twenty-five cases exhibited marked infiltration. Infiltration with erosion was observed in eighteen of the cases. Papillomatous growths were noticed in six cases, while one case showed a tuberculoma. (Figure 8.) The patient with the tuberculoma gives a history of about five years' duration. He has been observed by the author for the past two years with apparently no change in lesion. From the above, then, we learn that of the one hundred cases studied, ninety-one showed more or less involvement of the interarytenoid sulcus. This frequency of occurrence is easily explained by the fact that the interarytenoid space is a vulnerable point, due to its location and anatomic arrangement, making it subject to more traumatism than any other part of the larynx. The infiltration was generally of the broad base type, and usually confined to the middle of the sulcus. The color varied from a grayish tint to the redness of congestion. In a large number mucopurulent secretion could be seen adhering to the space. The "median fissure" was fre-

quently observed, while the "lateral furrow," as described by Casselberry,[3] was quite common. The infiltration was limited to the space in six cases.

ARYEPIGLOTTIDEAN FOLDS.

The aryepiglottidean folds were found clinically negative in sixty-two cases. Eighteen of the cases showed a bilateral congestion. Bilateral infiltration was present in seventeen cases. One case presented unilateral infiltration of the right fold, while in another the infiltration was limited to the left fold. In one case of the acute type both folds were markedly infiltrated and eroded. Thus we learn that infiltration of the folds was present in twenty cases. Of the twenty affected cases, eleven were in conjunction with a bilateral infiltration of the arytenoids. Four were associated with an infiltration of the epiglottis and arytenoids. One in conjunction with epiglottidean involvement. While the remaining four occurred together with involvement of one or more of the following structures: the interarytenoid space, ventricular bands, and vocal cords or processes. The above would seem to suggest that the folds are affected mainly by extension from the arytenoids or the epiglottis, and that the infiltration very seldom originates there.

ARYTENOID CARTILAGES.

The arytenoids were found clinically normal in thirty-six cases; eight of the cases showed a bilateral congestion. Bilateral infiltration was noted in forty of the cases. Unilateral infiltration was observed in twelve instances—eight of the right arytenoid and four of the left. Marked bilateral infiltration with erosion was noticed in three, while unilateral infiltration with erosion was seen in one. We then note that fifty-six of the series showed more or less infiltration of one or both arytenoid cartilages. Of these, forty-three had bilateral involvement, while in thirteen only was the infiltration limited to one side. Its high frequency of occurrence can partly be attributed to the prominent part played by the arytenoids in all expiratory acts, as in phonation, coughing, sneezing, etc.

VENTRICULAR BANDS.

The ventricular bands were found clinically normal in sixty-six cases. Seven cases showed a bilateral congestion. In fourteen of the cases a bilateral infiltration was observed, while unilateral infiltration was seen in twelve cases—four on the right and eight on the left. One case presented a marked bilateral infiltration with erosion. Thus twenty-seven cases showed affection of the ventricular bands. It was also noted that the infiltration of the bands was generally diffuse.

TRUE VOCAL CORDS.

The true vocal cords were found clinically negative in thirty-four cases. Twenty of the cases presented a bilateral congestion, while a unilateral congestion was noticed in four cases—two of the left cord and two of the right. Slight bilateral infiltration was observed in eleven cases. Slight unilateral infiltration in three, all confined to the right vocal cord. Marked bilateral infiltration was observed in seven cases, while marked unilateral infiltration was seen in two—one of the right and one of the left. Bilateral infiltration with erosion was observed in twelve cases, and unilateral infiltration with erosion was seen in seven cases, four of which were of the right cord and three of the left. The above shows that forty-two out of the one hundred cases studied showed involvement of the true vocal cords. Of these, thirty were bilateral while twelve were unilateral.

VOCAL PROCESSES.

The vocal processes were found to be affected early in the disease, and therefore were studied separately. Thirty-one of the cases presented a clinically normal appearance, while nine showed a bilateral congestion. Bilateral infiltration was observed in twenty-seven cases, while nine cases showed unilateral involvement—seven of the left and two of the right vocal process. Bilateral infiltration with erosion was observed in seventeen cases, while seven showed unilateral infiltration with erosion, of which five were of the right and two of the left. Thus we see that sixty cases out of one hundred showed involvement of the vocal processes, of which forty-four were bilateral and sixteen unilateral. The above indicates that the vocal processes were affected about as frequently as the aryte-

noids. It is of interest to note that affection of the vocal processes was associated with involvement of the other parts of the larynx, as follows: with the true cords in nineteen cases; with the arytenoids in eleven; with arytenoids and cords in twenty-one; and with the interarytenoid sulcus in nine. The proximity of the vocal processes to the arytenoids, true cords and interarytenoid space with the consequent trauma it is subjected to would readily explain the high frequency of involvement.

The foregoing discussion may be summarized as follows:

1. A clear conception of the nature of a lesion is of utmost importance. Without it we are unable scientifically to prognosticate and treat a disease.

2. The character of the lesion is one of the chief determining factors in prognosis.

3. In tuberculosis of the larynx the pathology does not differ in any way from the pathology of tuberculosis of the lungs.

4. There are three distinct types of laryngeal tuberculosis: acute, subacute, and chronic.

5. Cases of the acute and subacute type have symptoms referable to the larynx, and the diagnosis, as a rule, is easily made. On the other hand, cases of the chronic type very seldom suffer from annoying symptoms, and only on close scrutiny can the lesion be detected.

6. One of the important conclusions arrived at is that the frequency with which a part is affected is in direct proportion to the amount of trauma that part receives as a result of its location and its fuctional activity. The above is fully corroborated by the results of the study presented, in which it is shown that the most frequent site of involvement is the interarytenoid space, followed in order of frequency by the vocal processes, arytenoid cartilages, vocal cords, ventricular bands, aryepiglottidean folds, and epiglottis.

TABLE SHOWING IN DETAIL THE RESULTS OF THE STUDY OF ONE HUNDRED CASES OF LARYNGEAL TUBERCULOSIS.

SEX.	
Males	64
Females	36
Total	100

AGE.

Between 15 and 20	14
Between 21 and 30	53
Between 31 and 40	21
Between 41 and 50	12
Total	100

SPUTUM.

Positive	100

PULMONARY STAGE.*

Incipient	12
Moderately advanced	59
Far advanced	29
Total	100

LARYNGEAL STAGE.†

First stage	60
Second stage	33
Third stage	7
Total	100

CLINICAL TYPES.

Acute type	9
Subacute	52
Chronic	39
Total	100

*See Classification of the National Association for the Study and Prevention of Tuberculosis.

†See author's Classification of Laryngeal Tuberculosis.

EPIGLOTTIS.

Negative	16	
Congested	42	
Anemic	14	
Clinically nontuberculous total		72
Slight infiltration	20	
Marked infiltration	3	
Infiltration with erosion	5	
Tuberculous total		28
		100

INTERARYTENOID SPACE.

Negative	5	
Congestion	4	
Clinically nontuberculous total		9
Slight infiltration	41	
Marked infiltration	25	
Infiltration with erosion	18	
Papillomatous growths	6	
Tuberculoma	1	
Tuberculous total		91
		100

Note.—Infiltration limited to interarytenoid space in six cases.

ARYEPIGLOTTIDEAN FOLDS.

Negative	62	
Congested	18	
Clinically nontuberculous total		80

Slight infiltration	17	
Infiltration right	1	
Infiltration left	1	
Infiltration with erosion	1	
Tuberculous total		20
		100

Note.—Associated lesions:

With infiltration of arytenoids	11
With epiglottis and arytenoids	4
With epiglottis	1
With interarytenoid space, ventricular bands, vocal cords or processes	4

ARYTENOID CARTILAGES.

Negative	36	
Congested	8	
Clinically nontuberculous total		44
Infiltration right and left	40	
Infiltration right	8	
Infiltration left	4	
Infiltration with erosion, right	3	
Infiltration with erosion, left	1	
Tuberculous total		56
		100

Note.—

Bilateral involvement	43
Unilateral involvement	13

VENTRICULAR BANDS.

Negative	66	
Congested	7	
Clinically nontuberculous total		73

Infiltration right and left	14	
Infiltration right	4	
Infiltration left	8	
Infiltration with erosion	1	
Tuberculous total		27
		100

Note.—

Bilateral involvement	15
Unilateral involvement	12

VOCAL CORDS.

Negative	34	
Congestion	20	
Congestion right	2	
Congestion left	2	
Clinically nontuberculous total		58
Slight infiltration	11	
Slight infiltration right	3	
Marked infiltration	7	
Marked infiltration right	1	
Marked infiltration left	1	
Infiltration with erosion	12	
Infiltration with erosion, right	4	
Infiltration with erosion, left	3	
Tuberculous total		42
		100

Note.—

Bilateral involvement	30
Unilateral involvement	12

VOCAL PROCESS.

Negative	31	
Congested	9	
Clinically nontuberculous total		40

Infiltration right and left	27	
Infiltration right	2	
Infiltration left	7	
Infiltration with erosion	17	
Infiltration with erosion, right	5	
Infiltration with erosion, left	2	
Tuberculous total		60
		100

Note.—

Bilateral involvement	44
Unilateral involvement	16
Associated lesions:	
With true vocal cords	19
With arytenoid cartilages	11
With arytenoids and cords	21
With interarytenoid sulcus	9

TABLE SHOWING ORDER OF FREQUENCY OF INVOLVEMENT OF THE DIFFERENT PARTS OF THE LARYNX.

	Tuberculous.	Clinically Nontuberculous.
Interarytenoid space	91	9
Vocal processes	60	40
Arytenoid cartilages	56	44
Vocal cords	42	58
Epiglottis	28	72
Ventricular bands	27	73
Aryepiglottidean folds	20	80

AUTHOR'S CLASSIFICATION OF TUBERCULOUS LARYNGITIS.

Class 1.—Stage of infiltration.

1. Positive suptum. Negative in exceptional cases.
2. Recurrent or persistent hoarseness.
3. Dysphagia present or absent.
4. Signs of infiltration of any or all the parts of the larynx, especially interarytenoid space, vocal cords, aryepiglottidean folds, ventricular bands, arytenoid cartilages, or epiglottis.

Class 2.—Stage of edema with superficial erosion.

1. Positive sputum.
2. Persistent hoarseness.
3. Dysphagia present or absent.
4. Dysphonia present or absent.
5. Signs of tumefaction of part of the larynx with superficial erosion.

Class 3.—Advanced stage.

1. Positive sputum.
2. Marked hoarseness or aphonia.
3. Dysphagia present or absent.
4. Dysphonia present or absent.
5. Marked tumefaction and ulceration of any or parts of the larynx.
6. Perichondritis sometimes present.*

Author's Classification of Tuberculous Laryngytitis on Discharge.

Apparently Cured.—All laryngeal symptoms absent for a period of two years under ordinary conditions of life; the physical signs to be those of a healed lesion.

Arrested.—All laryngeal symptoms absent for a period of six months; the physical signs to be those of a healed lesion.

Apparently Arrested.—All laryngeal symptoms absent for a period of three months; the physical signs to be those of a healed lesion.

Quiescent.—All laryngeal symptoms absent for a period of two months; physical signs stationary or retrogressive.

Improved.—Laryngeal symptoms lessened or entirely absent; physical signs improved or unchanged.

Unimproved.—All essential symptoms and signs unabated or increased.

Classification of Pulmonary Tuberculosis According to the National Association for the Study and Prevention of Tuberculosis.

INCIPIENT.

Slight or no constitutional symptoms (including particularly gastric or intestinal disturbances or rapid loss of weight).

*Hoarseness, dysphonia and aphonia are usually absent in tuberculosis involvement limited to the epiglottis.

Slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours.

Expectoration usually small in amount or absent.

Tubercle bacilli may be present or absent.

Slight infiltration limited to the apex of one or both lungs, or a small part of one lobe.

No tuberculous complications.

MODERATELY ADVANCED.

No marked impairment of function, either local or constitutional.

Marked infiltration more extensive than under incipient, with little or no evidence of cavity formation.

No serious tuberculous complications.

FAR ADVANCED.

Marked impairment of function, local and constitutional.

Extensive localized infiltration or consolidation in one or more lobes.

Or disseminated areas of cavity formation.

Or serious tuberculous complications.

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3. Casselberry: Journal of American Medical Association, November 15, 1913, Vol. 61.

No.	Name	Age	Sputum	Pulm. Stage	Laryn. Stage	Type	Epiglottis	Aryepiglottic Folds	Arytenoid Cartilage	Interarytenoid Space	Ventricular Bands	Vocal Cords	Vocal Process
1	T. C.	24F	Positive	3	2	Subacute	Congested	Infiltration	Infiltration	Marked infiltration	Infiltration	Congested	Negative
2	P. H.	22M	"	2	2	"	"	"	"	Infiltration, erosion	Infiltration L.	Infiltration, erosion	Infiltration
3	S. G.	21M	"	2	1	"	"	Infiltration L.	Infiltration L.	Slight infiltration	Negative	Negative	Negative
4	T. H.	23M	"	3	1	"	"	Congested	Infiltration R.	Congested	Infiltration L.	"	"
5	S. L.	24F	"	3	3	"	Anemic	Infiltration	Negative	Papillomata	Infiltration	Marked infiltration	Infiltration
6	F. L.	42F	"	2	2	"	"	"	"	Marked infiltration	Infiltration R.	Infiltration, erosion	Infiltration, erosion L.
7	C. B.	20F	"	2	3	Acute	Slight infiltration	"	Infiltration, erosion	Infiltration, erosion	Negative	"	Infiltration, erosion
8	G. A.	37F	"	2	1	Subacute	"	Negative	Infiltration	Marked infiltration	"	Slight infiltration	Infiltration
9	B. T.	30F	"	2	2	"	Congested	Congested	Negative	Papillomata	"	Infiltration, erosion R.	Infiltration, erosion R.
10	McM.	18F	"	2	2	"	Anemic	Negative	Infiltration	Infiltration, erosion	"	Marked infiltration	Infiltration
11	B. I.	25F	"	3	1	Chronic	Congested	"	Negative	Slight infiltration	"	Congested	Negative
12	C. G.	22F	"	2	3	Acute	Marked infiltration	Infiltration	Infiltration, erosion L.	Marked infiltration	"	Infiltration, erosion L.	Infiltration
13	K. S.	18F	"	3	1	Chronic	Negative	Negative	Negative	"	"	Infiltration, erosion	Infiltration, erosion
14	S. R.	27F	"	2	1	"	"	"	Infiltration	Slight infiltration	"	Congested	Infiltration L.
15	T. C.	18F	"	2	1	"	Anemic	"	"	"	"	Negative	Infiltration

No.	Name	Age	Sputum	Pulm. Stage	Laryn. Stage	Type	Epiglottis	Aryepiglottic Folds	Arytenoid Cartilage	Interarytenoid Space	Ventricular Bands	Vocal Cords	Vocal Process
16	S. M.	20F	Positive	3	1	Subacute	Congested	Negative	Congested	Marked infiltration	Negative	Negative	Negative
17	D. J.	27F	"	2	1	Chronic	Anemic	"	"	Slight infiltration	"	Congested	"
18	McL.R	30F	"	3	1	Subacute	"	Infiltration	Infiltration	"	Infiltration R.	Negative	"
19	E. J.	27M	"	1	2	"	Infiltration, erosion	Negative	"	Negative	Negative	Slight infiltration	"
20	V. W.	32M	"	2	1	"	Anemic	"	"	"	"	"	Infiltration
21	C.	24M	"	2	3	"	"	"	"	Marked infiltration	Infiltration	Infiltration, erosion	Infiltration, erosion
22	B. G.	25M	"	2	2	"	Slight infiltration	"	Negative	Infiltration, erosion	Negative	"	"
23	K. J.	46M	"	2	2	"	Congested	"	"	Slight infiltration	"	"	"
24	R. H.	24M	"	3	2	"	Anemic	Infiltration	Infiltration	Marked infiltration	"	Infiltration, erosion R.	Infiltration, erosion R.
25	W. M.	19F	"	1	1	Chronic	"	Negative	Negative	Negative	"	Slight infiltration	Slight infiltration
26	Q. M.	22F	"	3	1	Subacute	Congested	"	Slight infiltration	Slight infiltration	"	Negative	Infiltration
27	M. C.	23F	"	2	1	Chronic	"	"	Negative	Slight infiltration	"	Congested	"
28	M. M.	21M	"	1	2	Acute	Slight infiltration	"	"	Infiltration, erosion	Infiltration	Marked infiltration	"

29	S. J.	42M	Positive	3	1	Chronic	Congested	Negative	Negative	Negative	Infiltration L.	Negative	Negative
30	F. J.	28M	"	3	1	"	Slight infiltration	"	Infiltration	Slight infiltration	Negative	"	Congested
31	W. L.	22M	"	3	2	Subacute	Congested	"	Infiltration R	Marked hyperplasia	"	"	Infiltration, erosion
32	G. J.	27M	"	2	1	"	"	Infiltration	Infiltration	"	"	"	Infiltration
33	M. C.	24M	"	2	1	"	"	Negative	"	Congested	"	Slight infiltration	Infiltration L.
34	B. K.	23F	"	3	1	Chronic	Anemic	"	Infiltration R	Slight infiltration	"	Slight infiltration R.	Negative
35	K. B.	27F	"	2	2	Subacute	Slight infiltration	"	"	Papillomata	"	Negative	"
36	R. J.	20F	"	2	1	Chronic	Congested	Congested	"	Slight infiltration	Congested	"	"
37	F. P.	18M	"	2	1	Subacute	Anemic	Negative	"	Slight hyperplasia	Negative	"	"
38	R. B.	23M	"	3	1	"	"	"	Infiltration L	Marked hyperplasia	"	Marked infiltration L.	Infiltration L.
39	T. S.	29M	"	2	2	"	Congested	Infiltration	Infiltration	Infiltration, erosion	"	Negative	Negative
40	K. H.	44M	"	2	1	"	"	Congested	Congested	Congested	"	Slight infiltration R.	"
41	M. B.	31F	"	2	1	Chronic	"	Negative	Negative	Slight infiltration	"	Negative	"
42	C. L.	27F	"	2	1	Subacute	"	Congested	Congested	"	"	Congested L.	Congested

No.	Name	Age	Sputum	Pulm. Stage	Laryn. Stage	Type	Epiglottis	Aryepiglottic Folds	Arytenoid Cartilage	Interarytenoid Space	Ventricular Bands	Vocal Cords	Vocal Process
43	B. L.	31F	Positive	2	1	Subacute	Congested	Infiltration R	Infiltration	Slight hyperplasia	Negative	Congested L.	Negative
44	C. J.	39M	"	2	3	Chronic	Negative	Negative	Negative	Tuberculoma	Infiltration R.	Marked infiltration	Infiltration
45	D. J.	49M	"	2	2	"	Infiltration, erosion	"	"	Marked hyperplasia	Negative	Negative	Negative
46	G. J.	45M	"	3	1	"	Congested	Congested	Infiltration	Slight hyperplasia	"	Congested R.	Congested
47	C. J.	29M	"	1	1	Subacute	Slight infiltration	Negative	"	Congested	Congested	Congested	"
48	K. I.	44M	"	2	1	Chronic	Slight infiltration	"	Slight infiltration	Slight infiltration	"	Negative	Negative
49	C. F.	28M	"	2	1	"	Congested	"	Infiltration R.	"	Infiltration L.	Congested	Infiltration L.
50	P. A.	34F	"	2	1	"	Anemic	"	Negative	Infiltration, erosion	Infiltration	Negative	Negative
51	M. B.	23F	"	2	1	"	Negative	"	"	Slight infiltration	Negative	"	"
52	D. M.	32F	"	2	1	"	"	"	Infiltration	"	"	"	"
53	S. E.	19F	"	2	2	Subacute	Slight infiltration	"	"	"	Infiltration	Infiltration, erosion L.	Infiltration, erosion
54	R. S.	33F	"	3	1	Chronic	Negative	"	Slight infiltration	"	Negative	Negative	Infiltration L.
55	B. C.	22F	"	2	1	Subacute	Slight infiltration	"	Negative	Marked infiltration	"	Slight infiltration	Infiltration

56	P. J.	29M	Positive	2	1	Subacute	Congested	Infiltration	Negative	Papillomata	Infiltration L.	Negative	Negative
57	B. W.	47M	"	2	2	"	Negative	Negative	"	Marked infiltration	Negative	Infiltration, erosion R.	Infiltration, erosion R.
58	W. A.	50F	"	2	2	"	"	"	"	Slight infiltration	"	Negative	Infiltration, erosion
59	B. G.	30M	"	2	1	Chronic	Congested	"	"	"	Slight infiltration	"	Infiltration
60	G. J.	28M	"	2	1	Subacute	"	"	Infiltration	"	Negative	"	Negative
61	A. J.	24M	"	2	2	"	"	"	Negative	Marked infiltration	"	Infiltration, erosion	Infiltration, erosion
62	M. M.	21M	"	2	1	Chronic	Slight infiltration	"	Infiltration	"	"	Congested	Congested
63	L. F.	45M	"	3	1	"	"	Congested	"	Slight infiltration	Congested	"	"
64	L. W.	22M	"	1	1	"	Negative	Negative	Negative	"	Negative	Negative	Infiltration
65	K. S.	24M	"	1	1	"	Congested	Congested	Infiltration	"	Infiltration	"	Negative
66	W. D.	19M	"	3	1	Subacute	"	"	Congested	"	Infiltration R.	"	"
67	S. E.	20M	"	1	1	Chonic	"	"	Infiltration	"	Negative	Congested	Congested
68	P. R.	31M	"	3	3	Acute	Infiltration, erosion	Infiltration, erosion	Infiltration, erosion	Infiltration, erosion	Infiltration	Infiltration, erosion	Infiltration, erosion

No.	Name	Age	Sputum	Pulm. Stage	Laryn. Stage	Type	Epiglottis	Aryepiglottic Folds	Arytenoid Cartilage	Interarytenoid Space	Ventricular Bands	Vocal Cords	Vocal Process
69	R. W.	35M	Positive	2	1	Chronic	Congested	Negative	Negative	Negative	Negative	Infiltration R.	Infiltration R.
70	R. L.	22M	"	2	2	Subacute	Slight infiltration	"	"	Infiltration, erosion	"	Infiltration, erosion R.	Infiltration, erosion R.
71	R. M.	22M	"	1	1	Chronic	Congested	"	"	Marked infiltration	"	Slight infiltration	Infiltration
72	F. J.	35M	"	3	1	Subacute	Slight infiltration	"	"	"	Infiltration	Congested	"
73	W. C.	40M	"	3	1	"	Congested	Congested	Infiltration	"	"	Slight infiltration	"
74	H. C.	42M	"	2	2	"	Slight infiltration	Negative	Negative	Infiltration, erosion	Negative	"	"
75	K. B.	21M	"	1	1	"	"	Congested	Infiltration	Slight infiltration	Congested	Congested	"
76	R. P.	45M	"	3	1	Chronic	Negative	Negative	"	"	Infiltration L.	Negative	Negative
77	C. J.	33M	"	1	2	Subacute	"	"	Infiltration L.	Papillomata	Negative	Slight infiltration	Infiltration
78	W. E.	22F	"	2	1	Chronic	Slight infiltration	Slight infiltration	Negative	Slight infiltration	"	Negative	Infiltration L.
79	M. A.	27M	"	3	2	Subacute	Marked infil. erosion R	Negative	"	"	"	"	Negative
80	M. B.	19F	"	2	2	Acute	Slight infiltation	"	Infiltration	Infiltration, erosion	"	Infiltration, erosion	Infiltration, erosion

81	Y. E.	32M	Positive	2	3	Acute	Marked infiltra.,erosion	Infiltration	Marked infiltra., erosion	Infiltration, erosion	Infiltration, erosion	Infiltration, erosion	Infiltration, erosion
82	D. E.	39M	"	3	2	Subacute	Negative	Negative	Negative	Marked infiltartion	Negative	"	Infiltration
83	H. I.	37M	"	2	1	Chronic	"	"	"	Infiltration, erosion	"	Marked infiltration R.	Infiltration, erosion R.
84	G. J.	21M	"	2	1	Subacute	Congested	"	Infiltration	Slight infiltration	"	Congested R.	Negative
85	S. S.	26M	"	1	1	Chronic	Negative	"	Negative	"	"	Slight infiltration R.	Infiltration, erosion L.
86	L. J.	23M	"	3	2	Subacute	"	"	Infiltration L.	Papillomata	"	Negative	Infiltration
87	G. H.	25M	"	3	1	Chronic	Slight infiltration	"	Negative	Slight infiltration	"	Congested	Negative
88	S. P.	21M	"	3	2	Acute	Marked infiltration	Infiltration	Infiltration	Infiltration, erosion	"	"	Infiltration
89	F. W.	34M	"	3	2	"	Congested	"	"	"	Congested	Infiltration, erosion	Infiltration, erosion
90	C. C.	28M	"	2	2	Subacute	"	Congested	"	"	Infiltration	Congested	"
91	K. A.	38F	"	2	2	"	Marked infiltration	Infiltraton	"	Marked infiltration	Negative	Slight infiltration	"
92	M. S.	18F	"	2	1	Chronic	Congested	Negative	Negative	Slight infiltration	"	Negative	Infiltration L.
93	M. L	30F	"	2	2	Acute	"	Infiltration	Congested	Marked infiltration	Infiltration	Marked infiltration	Marked infiltration

No.	Name	Age	Sputum	Pulm. Stage	Laryn. Stage	Type	Epiglottis	Aryepiglottic Folds	Arytenoid Cartilage	Interarytenoid Space	Ventricular Bands	Vocal Cords	Vocal Process
94	R. L.	34M	Positive	2	1	Chronic	Congested	Congested	Congested	Marked infiltration	Negative	Negative	Negative
95	R. G.	21M	"	3	1	"	Negative	Negative	Infiltration R	Slight infiltration	"	Congested	"
96	H. J.	25M	"	2	1	Subacute	Congested	Congested	Infiltration	"	Infiltration L.	"	Infiltration R.
97	R. L.	15M	"	1	1	Chronic	"	Negative	Negative	Marked infiltration	Infiltration	"	Congested
98	E. A.	21M	"	2	2	"	Slight infiltration	Congested	Congested	Infiltration, erosion	Congested	"	"
99	B. W.	34M	"	2	2	Subacute	Congested	"	Infiltration	Marked infiltration	Negative	Marked infiltration	Infiltration, erosion
100	G. F.	35M	"	2	2	"	"	"	"	Infiltration, erosion	Infiltration L.	Congested	"

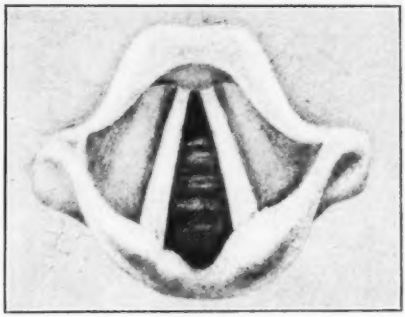

FIGURE 1.

S. G., aged twenty-one years. Sputum, positive. Pulmonary stage, second. Infiltration limited to left arytenoid and cartilage of Wrisberg. Slight superficial erosion can be seen Patient in good general condition, no hoarseness. Occasional dryness and tickling in larynx. Approximation of cords good. Diagnosis: Subacute tuberculosis of the larynx.

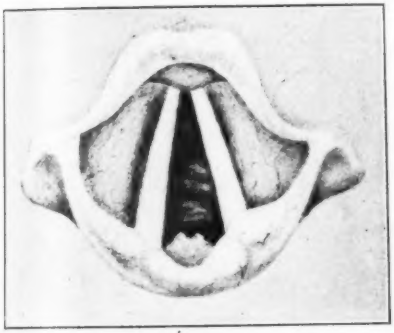

FIGURE 2.

C. J., aged thirty-two years. Sputum, positive. Pulmonary stage, first. Papillomatous infiltration of posterior commissure. Slight thickening of left arytenoid and cartilage of Wrisberg. Both cords slightly infiltrated and fibrosed. Constant dryness and irritation in larynx. Marked hoarseness for past three years. Wasserman four plus. Approximation of cords incomplete. Diagnosis: Subacute tuberculosis of the larynx.

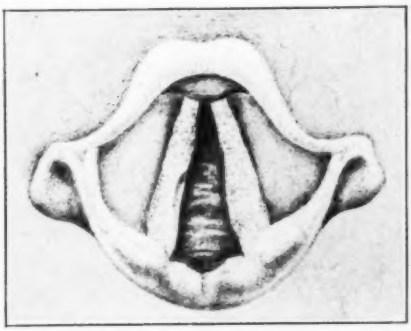

FIGURE 3.

K. J., aged forty-five years. Sputum, positive. Pulmonary stage, second. Marked infiltration of both vocal cords and both vocal processes. Cleft-like ulceration of right vocal cord. Slight interarytenoid thickening with medium furrow. Slight infiltration of left arytenoid. Approximation incomplete on phonation. Marked hoarseness. Diagnosis: Subacute tuberculosis of the larynx.

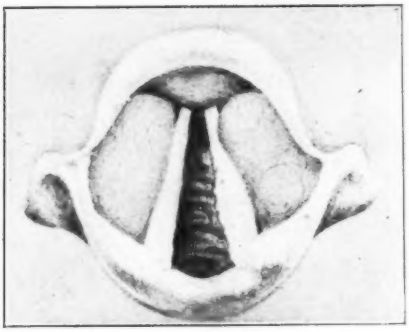

FIGURE 4.

J. A., aged twenty-four years. Sputum, positive. Pulmonary stage, second. Infiltration and erosion of both cords, especially left, with a longitudinal ulcer. Infiltration of both ventricular bands, partially covering true cords. Patient has marked hoarseness, and lesion, having passed an acute stage, is undergoing fibrosis. Diagnosis: Subacute tuberculosis of the larynx.

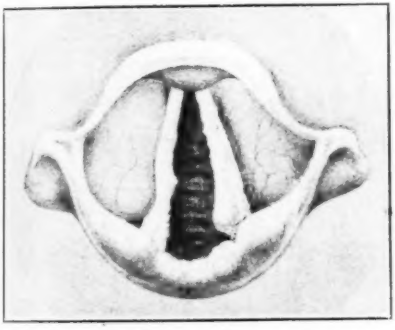

FIGURE 5.

C. J., aged twenty-three years. Sputum, positive. Pulmonary stage, second. Marked infiltration and ulceration of both cords, presenting a nibbled-out appearance. Interarytenoid hyperplasia with wrinkling of mucous membrane. Slight edema of posterior portion of right ventricular band. Diagnosis: Subacute tuberculosis of the larynx.

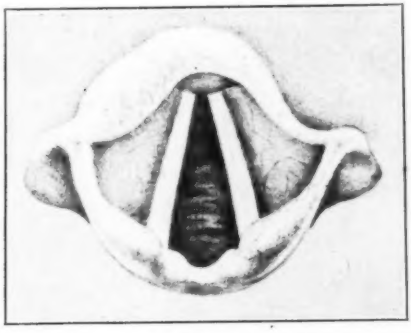

FIGURE 6.

M. A., aged twenty-seven years. Sputum, positive. Pulmonary stage, third. Infiltration limited to epiglottis, especially right side. Rest of larynx not affected. Patient has no hoarseness, no dysphagia. Occasional sensation of fullness and tickling in larynx. Diagnosis: Subacute tuberculosis of the larynx.

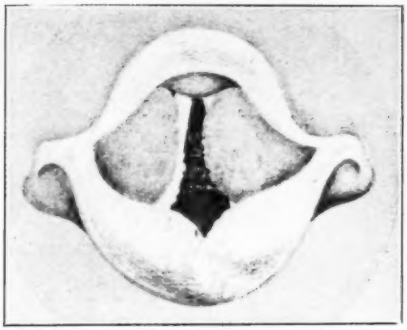

FIGURE 7.

P. R., aged thirty-one years. Sputum, positive. Pulmonary stage, third. Marked infiltration and ulceration of both arytenoids, presenting a pear-shaped appearance. Infiltration and ulceration of both true and false vocal bands, the latter almost entirely covering the true cords. Marked hoarseness, and sensation of fullness of larynx. Patient also gives a three plus Wassermann reaction. Diagnosis: Acute tuberculosis of the larynx, with a luetic infection as a probable underlying factor.

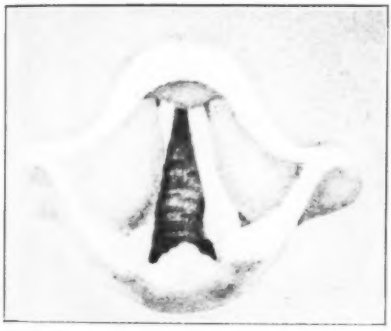

FIGURE 8.

C. J., aged twenty-eight years. Sputum, positive. Pulmonary stage, second. Tuberculoma of interarytenoid space with healed erosion. Thickening and infiltration of both cords, especially the left. Left cord also shows healed ulcerations on its upper surface. Infiltration of both ventricular bands, especially the right, which almost entirely covers the right cord. Lesion shows complete fibrosis, and outside of marked hoarseness, patient has no discomfort. Diagnosis: Chronic tuberculosis of the larynx.

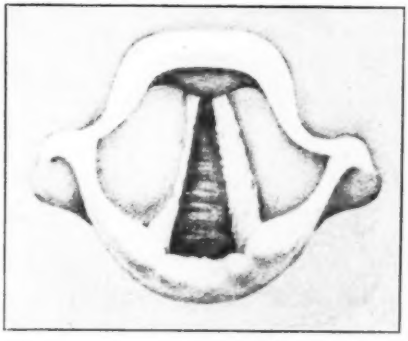

FIGURE 9.

L. F., aged forty-two years. Sputum, positive. Pulmonary stage, second. Marked infiltration of both cords, especially the left. Cords present a rough and granular appearance. Marked infiltration of right ventricular band overlapping the true cord. Interarytenoid hyperplasia with the characteristic "squaring" of the interarytenoid space. Slight general edema of the mucous membrane of the larynx. Hoarseness marked. Diagnosis: Subacute tuberculosis of the larynx, with slight tendency to fibrosis.

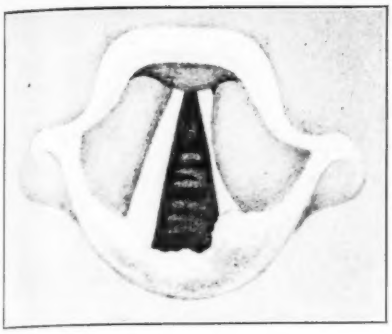

FIGURE 10.

Z. J., aged twenty-one years. Sputum, positive. Pulmonary stage, second. Marked infiltration and thickening of left arytenoid cartilage and left ventricular band, partially hiding the true cord. Other findings negative. No hoarseness. Diagnosis: Subacute tuberculosis of the larynx, with marked tendency to fibrosis.

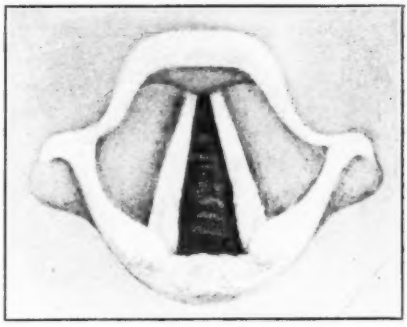

FIGURE 11.

H. H., aged twenty-one years. Sputum, positive. Pulmonary stage, second. Distinct interarytenoid hyperplasia with lateral furrows. Infiltration of both vocal processes. Note characteristic "squaring" of posterior commissure. (Casselberry.) Diagnosis: Chronic tuberculosis of the larynx.

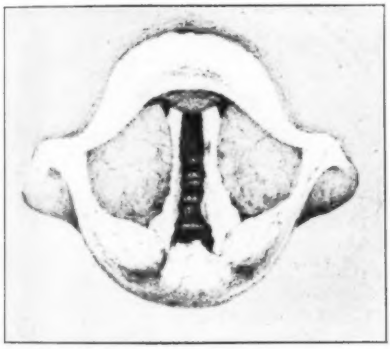

FIGURE 12.

C. B., aged twenty years. Sputum, positive. Pulmonary stage, second. Marked infiltration and superficial erosion of epiglottis. Infiltration and erosion of both true cords, ventricular bands and arytenoid. Marked interarytenoid hyperplasia with erosions. Distinct lateral furrows. Patient has marked hoarseness and sense of fullness in larynx. No dysphagia.

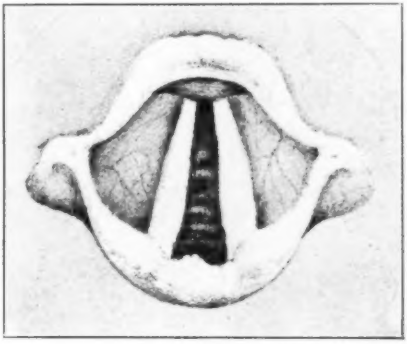

FIGURE 13.

Same as Fig. 12 after seven months of treatment. Edema almost entirely disappeared. Ulcerations with the exception of interarytenoid space all healed. Marked improvement in phonation. Lesion taking a more chronic course and healing by fibrosis. Diagnosis: Acute tuberculosis of the larynx, gradually healing by fibrosis.

XLVI.

THE RADICAL MASTOID OPERATION.*

By Thomas J. Harris, M. D.,

New York City.

In the year 1891, Stacke, at present professor of otology in Erfurt, brought forward an operation for the cure of chronic suppuration of the ear, which in its modified form is known the world over as the Schwartze-Stacke, or the radical operation on the ear. In the twenty-five years which have elapsed, the operation has been performed hundreds of times and by many operators. The present time, then, is a fitting one for an unbiased consideration of how far the operation may justly be regarded as accomplishing what it was designed for. We undertake this, not unmindful of the recent excellent paper on the same subject by Dr. S. MacCuen Smith.

To do this with any degree of satisfaction a correct understanding of two points is essential. For want of doing this, many a like inquiry has proved a failure. First, exactly what is the radical operation? Second, when is it indicated?

These two questions may be answered together in a single sentence, by saying that the radical operation, applied to the ear, means, as elsewhere in the body, an operation for the radical or complete removal of all disease, and is indicated when cure by other measures is found impossible.

The simple opening of the mastoid as devised by Schwartze had at the time that Stacke reported his operation been performed for eighteen years. While successful in many cases, especially in those of an acute nature, all operators found that it often failed to completely cure the disease when the suppurative process was a chronic one. To accomplish this,

*Read before the Annual Meeting of the Section on Diseases of the Eye, Ear, Nose and Throat of the Medical Society of the State of New York, May, 1916, held in Saratoga Springs, New York.

Küster[1] in 1889 recommended a more thorough eradication of the disease by the removal, where necessary, of the posterior wall of the external auditory canal, together with the malleus and incus. Two years later, Stacke, with the same end in view, based on a series of twenty-five cases which he had performed, advised attacking the disease in the middle ear through the auditory canal, for this purpose exposed by the familiar postauricular incision. When this had been done, the antrum was opened through the aditus and all disease removed. In addition, if dead bone or granulations were found in the mastoid cells, these were opened and cleaned out. To cover the bony defect, a flap was recommended to be thrown

As now practiced, the radical operation has widely departed from the posterior wall of the membranous canal.
from the original procedure of Stacke, and follows more closely the lines laid down by Küster, in that the antrum is opened in the usual way and then by an extensive lowering of the posterior canal, the mastoid cells and antrum, the middle ear and the external auditory canal are thrown together into one cavity, after thoroughly removing all disease.

It must be constantly borne in mind that the original indication for the operation, as laid down both by Küster and Stacke, was solely to cure a chronic suppuration. The fact that in the course of the operation intercranial complications are discovered, or of its performance as a means to relieve intercranial complications already discovered, must not be allowed to befog the simple and usual indications for its use.

Assuming that we are agreed now as to exactly what is the radical operation and what the true indication for its performance is, we are prepared to consider the main question before us—to what extent does the radical operation succeed in accomplishing what it is usually performed for? As far back as 1906, Dench, in a paper read before the American Laryngological, Rhinological and Otological Society (Transactions of the American Laryngological, Rhinological and Otological Society, 1906, page 258), reported his results to be seventy-five per cent of cures out of one hundred and seventy-three cases, the last ninety-five cases in this series showing eighty per cent of cures. Smith, in a paper read before the same society in 1915, reported eighty per cent of cures, which he claimed

could be increased to ninety-five per cent or better in private work; "in thirty-two per cent of operated cases the hearing was definitely better, in forty-nine per cent relatively the same, and of the remaining nineteen per cent, in eleven per cent the hearing decreased after operation according to actual record, and in the balance, or eight per cent, it decreased according to the statement of the patient."

These two distinguished surgeons possess in the highest degree the technic essential to produce the best results. It must be recognized, however, that all operators, and indeed most operators, do not possess their degree of surgical skill, and our inquiry has to do with the results obtained not merely by a few, but by many operators. Are the results reported by Dench and Smith the results which are being secured by the rank and file of aural surgeons today? Stated succinctly, have we the right to expect from the results of the last twenty-five years that the radical operation will usually cure chronic suppuration; second, that it is a safe operation so far as injury to the hearing is concerned; third, that it is reasonably free from dangerous complications?

An authoritative answer to these three questions is difficult. It may be impossible. Statistics are proverbially misleading, and any one who has had occasion to consult hospital records knows how woefully lacking they are.

Straws, however, show the direction in which the wind blows. A short time ago the writer had an opportunity to follow the dressings in probably the largest of the foreign clinics. He was amazed to see the number of suppurating ears persisting after the radical operation, as well as the large number of facial palsies. The operations had been performed by half a dozen or less operators possessing the highest surgical skill. In this country he has been permitted to examine, in one of the leading special hospitals, all the records obtainable of the radical mastoid operations performed during the last two years. These numbered eighty-five. In most of them an accurate functional test before operation was lacking. Also, in most cases no statement appeared of the condition of the ear at the time of discharge from the hospital. Twenty-four patients responded to a postal card requesting them to call for

examination. These cases were carefully examined, and the result of the examination is given under the four headings of

	Discharge	Hearing	Epidermization	Condition of Tube
1	Yes	Worse	Granulation	Granulation and on wall
2	Yes	V-10', W-2'		Open
3	No	?	Yes	Closed
4	No	?	Yes	Closed
5	No	?	Yes	Closed
6	Yes	Lost	Yes, except at open tube	
7	Yes, odor	Same	Still under treatment	
8	Yes	Worse	Partial	Open
9	No	Lost	Yes	Open
10	Yes	1' worse	Partial	Open
11	No	1'	Yes	Closed
12	No	None	Yes	Closed
13	Yes	2', better	Granulation inner wall	Open
14	No	Lost	Yes	Closed
15	No	Loud voice	Yes	Closed
16	Yes, odor	Same, 2'	Canal filled	
17	Yes, odor	Same, 2'	Under treatment	
18	Yes	Same	Granulation middle ear	Open
19	R. yes, slight*	1' better	Small post. wall	Closed
	L. No	2', worse	Yes	Closed
20	No	3'	Yes	Closed
21	Yes	1½'	Yes, except at open tube	
22	Yes, odor	2'	Except inner wall and open tube	
23	No	2'	Yes	Open
24	No	2'	Yes	Closed

*Lecture Case

This summarized represents twenty-four cases with twenty-five ears operated upon. Of these, twelve ears were found upon examination to be perfectly dry, or forty-eight per cent. Thirteen, or fifty-two per cent, were still discharging. Of these, odor was detected in five. As regards epidermization, the ear was found fully epidermized in fourteen, partly in three, while granulations were found in five. Two cases were

still under treatment. It may be added that in no instance had the operation been performed less than five months previous.

As regards hearing, except in one or two cases, no preoperative tests had been recorded. We were accordingly compelled to depend upon the statement of the patient as to the condition before operation. The Bárány noise producer was used in our examination in each case. Accurate statistics were found to be well-nigh impossible. The general impression gained from our questioning was that the hearing in the operated ear was for all ordinary purposes lost. Whether this condition obtained in most of the cases before operation it is impossible to state. Two patients, or eight per cent, reported the hearing improved; in four, or twenty per cent, it was reported as having remained the same; while in four, or twenty per cent, it was reported worse. Of the remaining fifteen, we were in doubt as to the condition in three cases, in four cases the whispered voice was heard at two feet, one at one foot, one at one and a half feet, and one at three feet. In all of these seven cases, only one of which heard at more than two feet, we can fairly regard the tests as showing the hearing lost, and in a general way, in spite of the lack of accurate statistics before operation, we are forced to the conclusion that the contention of those who claim that the hearing is improved or maintained by the operation, is not borne out.

In eleven of the twenty-five cases the eustachian tube was closed so far as could be determined. In nine cases it was open. In ten cases where the ear was found perfectly clean, the tube was permanently closed. In only two of the perfectly healed cases was the tube found open.

These statistics represent the work of approximately a dozen operators, all of them men with large experience. They do not differ, in our opinion, from the results obtained in other hospitals. The number of cases actually examined is not large. We cannot, however, with any degree of confidence believe that the remaining fifty-five cases would have given any different results. Moreover, from conversation with colleagues the country over, the findings are entirely in line with what in their experience exists.

Indeed, a careful analysis of the results reported by Dench indicates that what he regards as a cure differs from what we

understand it to be, for he qualifies his statement of "80 per cent of cures" by stating that "in no instance did the discharge remain profuse after the operation, all of the cases being either dry or presenting but slight discharge from the meatus." Further on he refers to cured cases returning at intervals with the complaint of discharge from the canals. Exclusion of such cases would decidedly alter the figures which he gives.

With the limited and insufficient data before us we are forced to the conclusion, then, that the results so enthusiastically claimed by some of the advocates of the radical operation are not being uniformly secured. It would appear that approximately fifty per cent, or every other case, shows, after an interval of several months following operation, persistence of the discharge to a greater or less degree.

We were, morever, impressed in our study of the cases by the frequency with which patients volunteered the information that the discharge from the ear was no whit better following the operation. In a still greater percentage of cases the hearing in the operated ear was for all practical purposes lacking, although we have no accurate information to show in how many cases the hearing was unsatisfactory before operation. This aspect of the ear, particularly from its economic standpoint, was to us most distressing, and should give food for thought.

Is the operation then on this account to be condemned or given up? A thousand times no. The innumerable cases that it has cured is sufficient proof that it has come to stay. Such being the case, what are the reasons for the failures in so large a percentage of cases? In our opinion, the two chief reasons are: First, failure in determining the proper indications for the operation, and, second, faulty technic in the operation or in the postoperative treatment.

First, in regard to the indications. There is no question in our mind that in many instances the radical operation is unnecessarily performed. An important discussion on this subject took place before the American Otological Society in Boston, in 1907. At that meeting papers were read by Dr. Crockett of Boston and Dr. McKernon of New York, while the discussion which followed was engaged in by numerous aurists from all over the country. The whole trend of the discussion

was in line with the assertion just made, namely, that the operation was being performed without a careful determination of the indications for its use. A suppurating ear extending over a few weeks or months, where the probe shows that no dead bone is present, is not a proper case for the radical operation. Such cases should be subjected to a careful and systematic course of treatment before any operation is to be considered. Especially is this true if the discharge is only intermittent and the hearing only slightly reduced. Proper drainage through incisions in the drum and unremitting care in keeping the nasopharynx clean, will perfect a cure in a large percentage of these cases.

The second group, where the radical mastoid is not required, as pointed out by McKernon, is composed of children with the history of discharge following the exanthemata. Here removal of the adenoids and tonsils with conservative treatment to the ear is the proper course to pursue. In this way the hearing is preserved. It is impossible in any of these cases to say how long local treatment should be kept up. The statement of McKernon is significant, that he has seen a number of cases in both hospital and private practice where after a radical operation the patient has volunteered the statement that if he had known the hearing would have become so poor he would never have had the operation performed.

With the risk of being regarded as an ultraconservative, we venture to say that the fetish that every suppurating ear is a volcano which may explode at any moment, is far from the truth, and is responsible for many an operation which otherwise would not be performed. Kipp, who at the time of his death had as large an experience as anyone in America, stated at the meeting just referred to that he had never seen intercranial complications follow ear trouble which was under treatment. While Kipp may have been more fortunate than most of us, the total number of such cases in any one man's practice cannot be large. Crockett is particularly emphatic in his advice against operating radically upon an ear with good hearing, in case the hearing in the other ear is destroyed, unless the indications are particularly exacting.

With patients with double chronic suppurative middle ear disease, he feels that only in the presence of symptoms indi-

cating danger to life should the radical operation be performed.

Again, when conservative treatment has failed to stop the discharge, it is by no means certain that the complete or radical operation is necessary. In the words of Blake, "the all-important point is the determination of the main source of the suppurative discharge, whether it is antral or postantral, or mainly from the tympanum, including the carious process in the ossicles, or whether spontaneously ceasing and frequently recurrent, it has its source from reinfections in the eustachian tube."

Careful study of the case, including the aid given by a good X-ray picture, will generally show whether the disease is limited to the antrum and mastoid cells. If so, the classical Schwartze operation will prove sufficient. In this way the middle ear will be left undisturbed and the hearing unimpaired.

All aurists are agreed as to the important rôle that the eustachian tube plays in keeping up infection in the middle ear. Bryant goes so far as to assert that every case of suppuration from the middle ear can be cured by appropriate treatment addressed to the nasopharynx. Hays,[2] in a paper read before the New York Academy of Medicine in 1910, quotes as the opinion of a large number of men with whom he has talked, that eighty per cent of all cases of suppuration from the ear can be cured by appropriate measures directed to the tympanum, without resorting to the radical operation.

An all-important part of such treatment is an effective checking of the infection from the nasopharynx. This the favorable reports presented in the paper by Yankauer in Chicago last year would show can be secured by the closure of the tube according to his method. This operation has now been before the profession for six years. We at first were inclined to feel that the closure of the tube was not a scientific procedure. In the light of the statistics given by Yankauer, representing one hundred and nineteen operators and a total of seven hundred and thirty-five operations performed, in which six hundred and nine, or eighty-three per cent, of the cases presented a closed tube, and in fifty-one, or five-tenths per cent, the suppuration cured, makes us feel that the operation is of decided merit. Yankauer, indeed, is so optimistic that he feels that

every case should be given the chance of a cure by closure of the tube before proceeding to the radical operation. While most of us are not prepared to follow him to that extent, it seems reasonable to assert that in cases where no necrosed bone is discoverable and the secretion is mucous rather than purulent, without odor, especially if the X-ray picture reveals little or no trouble in the mastoid cells, the operation should be performed, if only, as Yankauer suggests, as a preliminary step to the radical operation, which always demands the closure of the tube. Yankauer in his paper touches upon the all-important question of the effect of the operation upon the hearing. Concerning this he is equally encouraging, inasmuch as he states that in only four per cent of the cases was the hearing made worse, while in forty-six per cent of the cases it was reported as improved.

We are not enthusiastic in regard to the benefits of the conservative mastoid operation of Mr. Heath, but certainly his insistence upon the importance of an attempt to preserve the hearing and the neglect that aurists have shown in their operative work in this respect is deserving of the most careful consideration. It was clearly the intention and advice of Küster and Stacke that the radical operation should be performed only when the disease has been found to extend into the middle ear. If the operation is performed in this way, the criticism of Mr. Heath is not warrantable; but too often it is performed without any proper investigation of the exact situation of the disease. We fear the statement of Mr. Heath is only too true, that "with the exception of those patients the condition of whose ears had become so dangerous to life as to demand early operative assistance, the saving of the hearing has been purely a matter of good fortune."

To recapitulate, as the result of this investigation we are drawn to the following conclusions:

First, that the radical operation is an operation of undoubted merit.

Second, that it has been in the past and is today being performed often when not called for.

Third, that the results are by no means uniformly good, partial or complete failures occurring in a considerable percentage of cases.

Fourth, that improvement in the hearing cannot be promised. The most that can be offered, in the light of our statistics, is that the hearing will not be altered, although there is sufficient risk of lowering or destroying it to warrant reluctance or refusal to operate in case the hearing in the other ear is destroyed.

Fifth, that while accidents, including facial paralysis, are met with in the course of the operation, they are not of sufficient frequency or significance to have any bearing upon a decision in regard to the operation.

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XLVII.

ACCIDENTS IN BRONCHOSCOPY.*

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The subject of the direct method of examining the bronchi and the esophagus, together with the increase of the operative possibilities, now presents a broad field in the literature of laryngology; this, with the added great interest which has been shown in the subject by the profession in general, is the apology which I have to offer in attempting to add in a slight degree to this interesting study by presenting for your consideration a few accidents incident to our work.

An accident may be defined as an event that was unexpected, or the cause of which was unforeseen. My first case of bronchoscopy died as the result of an accident, when the patient seemed on the high road to recovery. With the time at my disposal the scope of the paper must be limited. An attempt has been made to recite a few personal experiences as well as a number of accidents I have been able to collect from the reports of other operators.

While increasing experience will diminish the possibilities of accidents in the future, we in this, as in all special fields in surgery, must expect the unforeseen to occur, and it seems remarkable to me, in a search through the literature, that so few accidents have been recorded.

It is wise for the reader in passing to remember in taking up the accidents in the operative use of the various instruments, that much might be added if we were to consider the fatalities incident to the nonuse of the bronchoscope.

No attempt has been made by Brüning, Jackson, Mosher or Johnston, in their recent books, to classify the accidents occurring in bronchoscopy and esophagoscopy. Johnston [1] quotes Kahler as having collected in the last two years two hundred

*Read at the Twenty-second Annual Meeting of the American Laryngological, Rhinological and Otological Society, May 5, 1916.

and ninety-one cases of foreign bodies where only twenty-seven, or 9.6 per cent resulted in death; a considerable number he states were due to accidental circumstances.

In the analysis of my cases I have arranged them under three divisions:

First.—Accidents during the anesthetic stage—that is, previous to actual instrumentation.

Second.—Accidents during the instrumentation, either for operation or examination.

Third.—Accidents occurring in the postoperative stage of our work.

Under the first heading may be grouped the following cases:

Case.[27]—Chloroform poisoning. Child, male, aged twenty months, was treated for laryngeal diphtheria. While in the contagious hospital the child coughed up a piece of a safety pin: X-ray showed part of the safety pin still in the left bronchus. He was transferred to a general hospital November 6, 1913. Preparation for operation; chloroform was administered by a member of the house staff, unfortunately not familiar with chloroform. In a short time attention was drawn to the child, who was found to be deeply under the anesthetic, which had been administered in great excess. No attempt was made to operate. The child died that evening, never regaining consciousness.

Case.[15]—Child, aged four years. Sudden dyspnea during administration of a general anesthetic, due to dislodging of foreign body from bronchus. Rapid tracheotomy; a seed three-eighths inch long was found lodged in larynx. Recovery.

Case.[28]—Accidental dislodging of foreign body incident to relaxation of general anesthesia. Girl, aged thirteen years. History of having swallowed a baby pin two days previous to operation. Anteroposterior radiograph, taken two hours before the operation, showed the object in the neck, lower end being on the level of the first tracheal ring. The pin was supposed to be in the esophagus. An attempt was made to palpate the same under general anesthesia; this proved negative. A nine-millimeter tube was passed into the esophagus; object was not found. It was thus considered the pin had passed into the stomach. While there had been no respiratory diffi-

culty and no change noted in the voice, as a precaution a seven-millimeter tube was passed into the trachea and the object could be seen at the opening of the right main bronchus. It is interesting to note that the removal was easily accomplished, although the pin was open.

Case.[28]—Child, aged eighteen months. Metal disc at the upper end of the esophagus. Under the relaxation of a general anesthetic the object had disappeared when the tube was passed. On further introduction the object was found at the lower end of the esophagus, and was successfully removed.

ACCIDENTS AT THE TIME OF OPERATION OR EXAMINATION.

Case.[27]—Child, aged three years. Sudden cessation of respiration during lower bronchoscopy under ether anesthesia; death. A superior bronchoscopy was done for the removal of a foreign body; careful search negative. A lower tracheotomy was performed. On introducing bronchoscope through tracheotomy wound the child suddenly stopped breathing. Death. No postmortem.

Case.[7]—Sudden death during bronchscopy through a lower tracheal opening. During manipulation, before foreign body was seen (a tack in the bronchus), the child suddenly became cyanotic and died.

Case.[7]—Sudden death during bronchoscopy through a lower glands. Child died suddenly during the bronchoscopy; immediate removal of the tube, artificial respiration, and other efforts negative. Autopsy showed a mass of glands in the mediastinum, pressing on the trachea and left bronchus, almost obliterating the lumen of both. This case is hard to understand from the autopsy, unless the tube passed into the left bronchus, thus cutting off the right or good lung.

Case.[1]—Sudden collapse, recovery, girl, local anesthetic, bronchoscope in the trachea, spasm of chest muscles which entirely shut off respiration. To all appearances child was dead. Under treatment she slowly rallied, and was normal within an hour.

Case.[1]—Sudden collapse of adult under cocain and ether anesthesia occurring during esophagoscopy. As tube entered the esophagus patient stopped breathing. The operation was discontinued; verge of death; stimulation, artificial respiration; recovery at the end of several hours.

Case.[1]—Male, adult; local anesthesia; bronchoscope passed into the trachea. Patient became suddenly unconscious and cyanotic, falling off stool; acted as previous case; recovery. Operator was unable to explain the cause in either case.

Case.[4]—Foreign body, a bean, fell over into the healthy bronchus when extraction was attempted, and induced asphyxiation with fatal termination.

Case.[4]—Same.

Case.[4]—Same.

Case.[28]—Accident to lighting element of bronchoscope during operation for removal of pin from bronchus of child aged twenty-four months necessitated discontinuance of operation.

Case.[28]—Accidental loss of foreign body, pearly part of an oyster shell in the esophagus for three days; X-ray located object. On attempting removal through an eleven-millimeter tube in upright position, the object was grasped by forceps, but they failed to maintain their hold; the object passed slowly down the esophagus, eluding the grasp of the forceps, and finally escaped into the stomach; recovery in stool.

Case.[33]—Perforation of esophagus at time of operation. Attempts were made to remove a safety pin from the esophagus by use of a Jackson tube. The object was not seen, but could be felt; several attempts were made to remove the pin, using the forceps blindly. Operation not successful; death. Postmortem, small perforation found in wall of esophagus.

Case.[6]—Accidental change of position of foreign body at the time of operation; small grain of raw corn not found in lung, but on withdrawing the tube it was found just beneath one vocal cord. With the child's head lowered the foreign body had left its original position in bronchus and gravitated to upper end of trachea.

Case.[28]—Accidental opening of a periesophageal abscess in effort to find a fishbone swallowed some days before. Passage of instrument, the number nine-millimeter Kahler tube, discovered small edematous area about one inch below cricoid cartilage. Object not found, but a sudden gush of pus proved that I had to deal with a small periesophageal abscess which had opened spontaneously. Recovery.

Case.[36]—Sudden flooding of bronchi in attempt to remove pin from the bronchus, due to opening a pulmonary abscess. Later lower bronchoscopy and successful removal.

Case.[37]—Pneumothorax developed during the attempts to remove hook by superior bronchscopy; removed subsequently by inferior bronchoscopy. Recovery of object and patient.

Case.[38]—Child, aged seven years. Sudden death during superior bronchoscopy, due to debilitated condition and prolonged manipulation, and not due to anesthesia. Autopsy.

Case.[5]—Accidental breaking of forceps. Failure to remove pin from left bronchus, so abandoned operation. At this operation the miniature lamp and a small piece of metal became detached and fell into the bronchus.

Case.[30]—Accidental slipping of forceps as foreign body reached the larynx; cyanosis; emergency tracheotomy. Late recovery of ring by direct laryngoscopy, the ring having remained in the subglottic region.

Case.[31]—Arrest of respiration during superior bronchoscopy. Rapid tracheotomy and successful inferior bronchoscopy.

Case.[32]—Bean dropped into opposite bronchi during extraction by superior bronchoscopy, again grasped and removed.

Case.[34]—Severe dyspnea during superior bronchoscopy necessitating rapid tracheotomy.

Case.[35]—Severe spasms and cyanosis during superior bronchoscopy for removal of bean. Rapid tracheotomy. Recovery.

Case.[4]—Asphyxiation during attempts at removal of a marble bead. Rapid tracheotomy. Recovery.

Several cases.[4]—Foreign body too large to extract through larynx. Note.—Cases of this type might be included.

Case.[9]—Woman, aged thirty-six years. Interesting accident. During attempt to remove a plum stone from right bronchus the forceps slipped at larynx and the stone dropped into left bronchus. It was seen and grasped but could not be removed, and the patient died in a few hours. Postmortem. The stone was found in left upper lobe of bronchus firmly imbedded. Paterson [17] quotes Brunning as suggesting the use of a bronchial protector to cover opposite bronchus before attempting removal of this type of foreign body.

Case.[9]—Boy, aged fourteen years. Death from severe hemorrhage at the time of operation. Button imbedded in granulation tissue in the left main bronchus. Attempt to remove it with blunt pointed tenaculum through bronchoscopy tube caused severe bleeding. Patient had coughing fit followed by

an enormous wave of bright red blood from a pulmonary vein. Patient died promptly from exsanguination.

Case.[8]—Accidental perforation of the esophagus during an esophagoscopic examination made by an experienced surgeon and with due care. Perforation of esophagus was found at autopsy above a cancerous growth. A retroesophageal abscess had developed and patient died of inhalation pneumonia.

Case.[2]—Kummell, 1913.—Accidental perforation of esophagus in two cases, not with the esophagoscope, but with the preliminary introduction of the bougie at the time of the operation. In both cases the mishap proved fatal. In both the lack of subjective disturbance at the time and the absence of bleeding as seen by the esophagoscope are noted; abscess developed outside the esophogus (might have been saved by opening). It is of interest to note that no later than 1912 an American laryngologist recommends in passing a tube for direct examination that it is desirable to first locate the position of the body by a bougie and to use an obturator in passing the esophagus.

Case.—(B)—Slipping of forceps in recovering tack from bronchus. Lost—further search negative. Tube withdrawn; tack found almost immediately in mouth.

Case.—(B.)—Another case same.

Case (B)—Slipping of the forceps, loss of the tack. Unable to find; operation abandoned. New radiograph showed the tack in opposite upper bronchus; removed, having secured stronger forceps.

Case.[4]—Emphysema skin; phlegmon and fatal mediastinitis from accidental pricking of trachea during removal of cigar tip from bronchus.

Case.[16]—Slipping of forceps, releasing foreign body at the time of removing. Remained impacted in subglottic space and easily removed by the crocodile forceps.

Case.[39]—Child, aged seventeen months. Sudden death twelve hours after removal of jackstone from esophagus by esophagoscopy. Anesthetic. No postmortem. Death ascribed to either shock or subglottic edema.

Case.[40]—Pulmonary abscess, death. Child; bronchoscopy. Removal piece of fig. Child developed pulmonary abscess. Death; cause, incomplete removal of foreign body.

Case.[40]—Shock; child. Bronchoscopy for the removal of a peanut; successful. Case was almost moribund at the time of operation. Died within a few hours.

Case.[42]—Male, aged forty-six years. Patient died one week after direct laryngoscopy. Only case of death in operator's practice from general anesthetic. Gangrenous bronchitis due to delayed chloroform poisoning.

Case.[41]—Child, aged four years. Death. Rhythmic convulsions three hours after direct laryngoscopy. Idiosyncrasy to cocain.

PRECAUTIONS.

The longer we work with delicately constructed instruments in the still more delicate living tissues of the bronchi and lung and the esophagus, the more fully do we realize the statement attributed to Dr. Killian,[2] namely, that the manipulation of foreign bodies through the esophagoscope was not everybody's business. This point is emphasized by Jackson,[10] who in replies from three hundred and eighty American laryngologists found that only thirty-five cared to do the work, and only seventy-nine had attempted the same. We are all anxious for the work to progress on scientific and safe lines, and it is interesting to note the enthusiasm which is shown by the men taking up this work in one of the New York postgraduate schools where a course is given by me in the principles and preliminary steps in the use of the bronchoscopic instruments. These men realize they have only begun their work in a department of laryngology in which the field is broad and the technic precise and progressive.

Before taking up our analysis of the cases, we must assume that bronchoscopy is a hospital operation, and the earlier we see the case the better the possibilities of our work, and the better prognosis to the patient.

In our first group of cases the difficulties of anesthesia are to be overcome. In these days of specialists in anesthesia the question of the administration of a general anesthetic in our larger cities can be easily met. It has been my custom to try to secure the services of one of these men to relieve me of the responsibility of this part of the operation, and those who have seen the work of Dr. Gwathmey in his administration of the anesthetic by the rectal method, will realize the aid which

it can be to the operator. Time will not permit me to take up this subject more fully.

Mention must be made to emphasize the value of oxygen in combination with ether or chloroform in cases with the slightest degree of dyspnea, and a plea for its use from the beginning, anticipating rather than awaiting the development of trouble.

To those who advocate and are able to work without the use of an anesthetic the question is easily solved. It is not my experience, nor have I witnessed any success in children, of attempts to examine the larynx and trachea without the use of an anesthetic. In one case I was successful in using Dr. Jackson's long spatula for the removal of a coin from the upper part of the esophagus in a baby without the use of an anesthetic, but then only with the combined assistance of three medical men. Up to this point I have felt that my work could be more easily accomplished and with greater safety to the patient, if I had the assistance of a skilled anesthetist. I have had only one fatal case that could be attributed to the use of the anesthetic. If there be a risk it is regrettable that the cases have not been reported, for we do not desire to exaggerate the dangers of the general anesthesia in this special branch of surgery, since in other operations we are so strongly urging the use of anesthesia for the relief of pain as well as mental effect on the future of the child.[10] It is suggested that in use of general anesthesia the cough reflex should not be abolished, and that we may use general anesthesia in children when a sharp body threatens perforation. The drawback to a general anesthesia, as given by one writer,[10] is a risk of respiratory arrest when the operator begins to manipulate the foreign body. In our first subdivision of cases we have one death from anesthesia. One case of sudden dyspnea due to dislodgement of foreign body, with recovery. Two cases in which change of position of foreign body was undoubtedly due to relaxation of a general anesthetic. The death can be attributed to the lack of a trained anesthetist. I see no way to avoid the accidents in the three other cases of change of position of the foreign body, and still feel that the struggle incident to the nonuse of a general anesthetic more than counterbalances the possible harm.

Under the second division we find the following cases reported:

Sudden death.—One case (cause obscure).
Sudden dyspnea.—Seven cases, three deaths.
Collapse.—Three cases, no deaths.
Change of position of foreign body.—Ten cases, four deaths.
Accident to lighting element.—Two cases.
Accidental slipping of forceps.—Four cases.
Opening periesophageal abscess.—One case.
Opening pulmonary abscess.—One case.
Added foreign body from broken instrument.—One case.
Pneumothorax.—One case.
Hemorrhage.—One case, one death.
Perforation of esophagus.—Three cases, three deaths.
Emphysema traumatic.—One case, one death.

It is of interest to note that the case of sudden death on the table could only be accounted for by the debilitated condition of the patient, plus the prolonged manipulation. The author distinctly stated that the anesthetic was not at fault. Sudden dyspnea with seven cases and three deaths seem hard to explain; of the two deaths, one at least would seem to coincide with the period of the operation considered dangerous by Dr. Jackson when performed under general anesthesia—namely, respiratory arrest when the operator begins to manipulate the foreign body. Three cases of collapse are noted. Mosher speaks of a cardiac arrest, reflex in type. Johnston's two cases of collapse were under cocain anesthesia. The change of position of the body during attempts at removal could be accounted for by the forceps losing their grasp and the object slipping. The construction of the forceps and the numerous new tips which have appeared will no doubt lessen this accident in the future.

Of the three deaths due to perforation of the esophagus, one was a pure accident, the two others were accidents which I am sure would not occur today, the lesson having been learned by the bronchoscopist,[13] [14] and the grave dangers to the preliminary probing to locate foreign bodies and the use of the obturator in introduction of the esophagoscope are now fully recognized. The golden rule is to keep your eye on the presenting body at the end of your tube from start to finish.

It is well to again warn the general practitioner and the surgeon who still persists in the blind extraction of foreign bodies.

I have not found any cases of acidental death due to short circuiting, from use of rheostat and commercial current.

Under class three we note the following:

Edema larynx.—Ten cases, two deaths.
Pneumonia.—Five cases, five deaths.
Periesophageal abscess.—One case, no death.
Pneumothorax.—One case, no death.
Pulmonary abscess.—Two cases, two deaths.
Hemorrhage.—Four cases, three deaths.
Right hemiplegia.—One case, no death.
Thymus.—One case, one death.
Hysteric edema.—One case, no death.
Convulsions and paralysis.—One case, one death.
Shock.—Three cases, three deaths.
Chloroform poisoning.—One case, one death.
Cocain poisoning.—One case, one death.

The most frequent accident in our postoperative cases is edema of the larynx. Ten cases with two deaths. Kummell[3] even favors a tracheal opening under five or six years to avoid subglottic edema. It is well to note here the word of warning given by Jackson,[26] that postoperative edema in children must not be ascribed to edema until the bronchoscope has been passed to drain the mucus. He reports that children become dyspneic within twenty-four to thirty-six hours, not from subglottic edema, but from an accumulation of bronchial secretions relieved by second passing of the bronchoscope and the removal of a large quantity of secretion. Try this first, especially in young children, before doing a tracheotomy, but never wait.[26] In a dyspneic patient tracheotomy should be done early, never late. Other precautions are use of small tube, avoidance of trauma on introduction and pressure during manipulation of tube. One case is noted where tube size number nine millimeters was used in a child. This of course might justly be assigned to a faulty technic. Two deaths from anesthetic, one chloroform, one cocain, the operator tells us would

not happen at present, owing to added precaution taken by him.

Pneumonia is next in frequency, five cases with five deaths. This suggests more caution in use of anesthesia, avoidance of prolonged manipulation and care to avoid trauma. Elevation of foot of bed helps to drain the bronchi, especially in young children. The three cases of death from shock seemed to have been unavoidable. The skill and experience of the operator must be taken into consideration in these cases of shock as well as the other accidents cited. It is reported[25] that the greater percentage of fatalities in this work occurred in cases where operator's total number of cases were less than three.

CLASS OF ACCIDENTS TO OPERATOR.

Before closing I would ask you to note one case reported in which a cocain solution being used in a bronchoscopic examination was coughed into the eye of the operator, causing a paralysis of accommodation. The second case, one of my own, is interesting; for the pin, a sharp steel lace pin, was coughed out through a bronchoscopy tube with the force of a dart from an air rifle, hitting the lens of my glasses with considerable force. Both cases emphasize the necessity of protecting the eye in this work.

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XLVIII.

A FACTOR IN THE PROGNOSIS OF ACUTE SUPPURATION OF THE MIDDLE EAR.*

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We have been taught that the prognosis of acute suppuration of the middle ear depends upon the powers of resistance of the patient, the severity of the infection, and the time at which drainage occurs, either spontaneously or as the result of paracentesis of the tympanic membrane, but it is the purpose of this paper to show that there is another factor which influences largely the termination of this disorder, and one that has not been given the consideration which it deserves, namely, the differences which may exist in the anatomic structure of the mastoid cells.

Examination of a considerable number of mastoid bones will reveal a great variation in the size, number and arrangement of the pneumatic cells in different specimens, in some instances the cells being large, in others small, some mixed, with large cells posteriorly, in others a few large cells adjacent to the antrum and in the tip, while in others the posterior portion contains few or many small cells with walls of variable thickness.

The cortex, also, is thicker in some instances than in others, while the extent of the cellular structure seems to vary according to the type of skull from which the bone examined is taken.

In brachycephalic skulls the cells do not extend, as a rule, as far posteriorly as in dolichocephalic skulls, while the sigmoid sinus is apt to be found somewhat nearer the meatus than we usually find it in the latter type. It is, consequently, worth while noting the type of skull before proceeding to operate on a patient for mastoiditis, as the slightest hint as to the location of the sinus is of value. These differences are marked and constant, and a little observation will enable one to readily

*Read before the Pan-American Medical Congress, San Francisco, June, 1915.

determine the type of head from which a given mastoid comes.

It is of interest to know in what manner different formations of cell structure can influence the course and termination of an infection in these parts, and in order to determine this it is necessary to briefly consider the pathology of mastoid inflammation as a whole.

It should be kept in mind that the mastoid cells are lined with a membrane similar to that lining the cavity of the middle ear, and a suppurative inflammation of the tympanum can extend by continuity, and also by the infection of cells distant from this point by contact of pus which has been forced by pressure or gravitated through the aditus and antrum into these relatively distant parts.

In mastoiditis we are not dealing with a true caries, but with a rarefying ostitis which has a definite and extremely interesting pathology.

As soon as infection of the cell lining occurs the membrane swells to from ten to eighty times its ordinary thickness, and, becoming lobulated, presents the form of true granulation tissue, while the interstices are filled with bacteria-laden pus.

The cell wall beneath the membrane now becomes studded with osteoclasts which gradually erode the bone until two or more cells are converted into one, and this process continues to the point where the inner or outer table have been perforated. There is now a reversal of this condition. As soon as perforation occurs the osteoclasts disappear and their place is taken by osteoblasts that build up a substance which finally becomes bone of the hardest variety. We know that the greater the relative surface exposed to infection, the greater is its power of resistance, as there is more surface from which may emerge the germ destroying leucocytes, and when we consider the fact that the surface of a sphere increases as the square of the diameter and the contents by the cube, it is obvious that the smaller the cell is the greater is its resisting power.

Continuous observation of cases operated on, both as to the nature and virulence of the infection, and as to the size of the cells, shows conclusively that the above theoretic proposition is borne out in clinical experience.

The question now arises, how are we to determine in advance the nature and extent of the cellular structures which are or may soon be invaded?

It is my practice in every case of suppuration of the middle ear to ascertain the nature of the infecting agent, to note the type of skull in the patient under consideration, and to have a skiagraph made of the mastoid bone on the affected side.

In some instances the latter is not easy of accomplishment, but an expert skiagrapher can nearly always secure a plate sufficiently clear for all practical purposes.

Having, then, secured the picture of the cellular structure of the mastoid, and knowing the variety of pathogenic bacteria responsible for the inflammatory state, it is not difficult to prognosticate with reasonable success the probabilities as to whether or not mastoiditis will supervene.

Given a streptococcic infection and large cells in the mastoid, it is self-evident that the chances for such an unfortunate complication would be far greater, all else being equal, than where the infection was of the influenza bacillus and the cells small and of uniform size in their tendency.

The following case reports will serve as illustrations of the propositions set forth:

Miss L., aged twenty-six years. Previous health good. First symptom of aural difficulty, pain in the right ear, with great impairment of hearing, followed in about one hour by a profuse discharge of pus. Fourteen hours later, symptoms of like character began in the left ear, followed by a like discharge of pus in a little over three-quarters of an hour. Bacteriologic examination of the discharging pus showed a pure culture of streptococci in each ear. Type of skull, brachycephalic. The skiagraph showed absolutely no mastoid cells whatsoever. Suppurative process ceased in both ears inside of a week, with no noticeable impairment of hearing.

Deductions as follows: This patient probably had a small antrum and few, if any, pneumatic cells. The limited capacity of the bone for the storing up of pus caused rupture of the tympanic membranes from hydrostatic pressure at an extremely early period for an adult, while the nature and extent of the cellular structure presented the highest possible powers of resistance to the infecting agent.

Mr. R., aged thirty-eight years. Following an attack of influenza, he had pain in left ear for two days, with mastoid tenderness on the third day. First seen on the fourth day. At

this time the patient's hearing in the affected ear was nil. Examination showed the tympanic membrane nearly normal in appearance and no bulging of the canal. Temperature 103° F. and perspiring freely during sleep. The mastoid tip was so tender it could not be even touched without causing great pain, and the patient complained of intense throbbing headache. Type of skull, brachycephalic. Blood count showed leucocytosis of 14,000 and neutrophiles 83 per cent. On the fifth day patient was sent to hospital and the mastoid opened. There were two extremely large cells below the antrum, the lower one occupying the entire tip and completely filled with pus and some granulation tissue. There was little pus and no granulation tissue in the cell above, and but few other cells found, and these were healthy. Bacteriologic examination of the pus found in the cells showed influenzå bacilli and pneumococci.

Deductions: Large, freely communicating cells of small resistance and a rather severe infection. The size of the cells enabled them to act as a reservoir for the storage of pus, and the lower one in the tip became speedily infected. An unusual feature of this case is the lack of pronounced middle ear symptoms. Patient's hearing has never been better than ten-thirtieths since his recovery.

Mr. M., aged forty-one years. Following influenza he had severe pain in the right ear for six days, when the ear discharged spontaneously. I saw him first three days after this. Patient complained of violent headache, intense pain in the ear and weakness. Examination showed a large perforation of the drum head, but no bulging of the canal and no tenderness of the mastoid. Type of skull, dolichocephalic. Blood count revealed slight leucocytosis and polynuclear count of 79 per cent. X-ray showed a great number of small cells, nearly uniform in size, extending far posteriorly. Infection, influenza bacilli. Patient gradually developed symptoms of mastoiditis, but refused operation. However, on account of the persistent headaches and fear of permanent loss of hearing, he finally consented, ten weeks after the onset of the middle ear symptoms, to have the mastoid operation performed, as advised.

A great number of cells were found, filled with granulation tissue, but no pus.

Deductions: Mild infection, with small cells of great resisting power, enabled the patient to go on for a long time with comparatively mild symptoms. There is a possibility that this case might have terminated in resolution, if not operated on, but I doubt if his hearing, which is now normal, would have been as good.

The recitation of such experiences could be extended, as my observations along this line have been carried out for some years, but the ones selected to report are so typical and so representative of the whole number observed, that I do not feel it necessary to continue the report in further detail.

I assume, therefore, from the premises and the clinical phenomena observed, that anatomic variations in the cellular structure of the mastoid bone of different individuals influence to a marked degree the occurrence or avoidance of mastoiditis as a complication of acute suppuration of the middle ear.

Nor does the advantage of our knowledge of these facts stop here, for I venture to assert that such observations aid us in being able to conscientiously advise, at an earlier period than we otherwise could, in many cases, the performance of the mastoid operation.

XLIX.

A STUDY OF THE PHYSICOMECHANICAL FUNCTION OF THE FAUCIAL TONSIL.*

BY

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CHICAGO,

The study described in this monograph was undertaken for the purpose of throwing light on certain observations and certain quandaries which had arisen in the course of the practice of the authors. They had come gradually to realize that the appearance of tonsillectomized throats, as observed from time to time, had often indicated anything but ideal anatomic results, and in certain instances had pointed to unmistakable impairment of the depressor palatal muscles. A few cases had been met with in which the speaking voice had, following tonsillectomy, been seriously and permanently impaired. A few published reports had mentioned impairment of the singing voice as well. The articles of Dr. G. Hudson Makuen and Dr. Thos. R. French had made an impression. And perhaps more than all else, a feeling that the exclusively radical attitude of the profession with reference to operation on the tonsils of children, in view of the fact that the danger from such operation to the possible later development of the voice for artistic purposes remained as yet unsettled, was at least open to serious question. It seemed to them that the parents of the children and the children themselves possessed an inherent right to expect from the medical profession who cared for the children, in any procedure carried out for the child's health,

*Presented to the Chicago Laryngological and Otological Society on March 21, 1916.

Note.—In this monograph the term "tonsil" will be employed to designate lymphatic tissue and capsule together, as a single organ.

certainly full consideration of a function which might later turn out to be of inestimable value to the child, and of great importance to society as a whole.

Earlier in the history of the operation of tonsillectomy, one of the authors of this article had expressed himself as believing that the preservation of the function of the depressor palatal muscles, and so of the capabilities of voice development following tonsillectomy, was dependent upon carefulness and delicacy of technic in the performance of the operation. But in spite of the recent great advances made in respect to technic, the deformities of the throat following tonsillectomy are giving no certain indication of diminishing. While undoubtedly they may be aggravated by crudeness of technic, or by lack of operative skill, yet these deformities evidently are preventable neither by manner of operation nor by delicacy of technic. Dr. Makuen has forcibly pointed out cases of deformity of serious importance occurring in the hands of the most skillful operators.[1] The authors of this article can emphasize these observations from cases which they also have studied. In individual instances one may, by studying the end results of operations which he knows to have been done with great care and with great delicacy as to technic, witness a most surprising resulting picture of throat deformity.

In the systematic examination of tonsillectomized throats, one has it forced upon him that in most instances something has resulted to the throat besides the mere removal of a tonsillar mass. Not in all, but in a very large proportion, there is presented quite an altered anatomic picture. The relative regularity of this picture of deformity is of itself alone a most striking fact, and sufficient of itself to indicate the probable existence of a definite function of the tonsil with reference to the lower palatal muscles. If such a definite function exists, one would expect the deformities which resulted from total extirpation of the tonsil to present a certain tendency to uniformity in the manner of impairment of the action of the palatoglossus and palatopharyngeus muscles, and this uniformity to be directly traceable to the deprival of these muscles of a definite accomplishment with reference to their action performed previous to operation by the removed tonsil.

The authors are well aware of the incompleteness of the

following study. They especially regret that up to this time they have not been able to obtain a cadaver upon which the anatomic results of tonsillectomy could be studied. But in spite of incompleteness they feel warranted in presenting their findings at this time, if for no other reason than that others may be encouraged to take up the subject for further study.

The manner of presentation of the matter in hand will be to discuss, first, the relationship of the tonsil to each of the depressor palatal muscles as shown by anatomic study; second, to point out the presumptive effect of depriving either muscle of the aid of the tonsil, and, third, to tabulate the corresponding facts as observed on tonsillectomized throats.

In the throats studied anatomically, we find only minor variations in the relation of the tonsils to the pillar muscles. Whether important variations may at times occur would require dissection of many throats. We have dissected five tonsils. From the standpoint of the investigation in question the extirpated tonsil is deceptive, since such a tonsil, if its capsule and mucous membrane covering remain intact, is by the action of these coverings bunched into a ball-like mass. In the throat, however, the border of what may well be called the floor of the tonsil—i. e., that part which lies against the lateral wall—tends to flatness, and may be tucked into narrow places where narrow padding is required. This floor presents definite border limitations, excepting below, where it becomes a part of the fascia bearing that part of Waldeyer's ring of lymphatic tissue which passes downwards into the laryngopharynx. Above and anteriorly the curved border of the floor parallels essentially the palatoglossus muscle. Following the border from below upwards, it lies between the palatoglossus and the superior constrictor, but drops below the palatoglossus as the latter approaches the soft palate.

The border curves downward at the palate and then parallels the edge of the palatopharyngeus at a short distance from this edge until the muscle enters the body of the pharyngeal wall. The attachments of the capsule to the palatopharyngeus are relatively short, and as one passes downwards into the laryngopharynx they become so short that separation is often impossible without bringing away muscle fiber. The floor of the tonsil spreads itself out over the superior constrictor, from

which it is separated by a loose areolar tissue. The relation of the tonsil to this tissue is one of contiguity rather than of continuity; and yet, in one tonsil of the five examined, a thin, broad plate of connective tissue passes downwards along the inner surface of the superior constrictor and, overlapping the outer surface of the capsule of the tonsil, merges into its structure. In that one case the impression is directly given that the tonsillar capsule constitutes an elaboration of the intrapharyngeal aponeurosis, as is believed by Descomps, Patterson, Makuen and others. The impression is fully confirmed as one follows the capsule into the laryngopharynx, where its direct continuation unquestionably does become the intrapharyngeal aponeurosis. Removal of the capsule exposes the bared surfaces of palatoglossus and palatopharyngeus muscles, and often also of the superior constrictor, exactly as muscles are exposed more posteriorly and lower down by removal of the aponuerosis. Moreover, the elaboration of the tonsil into a structure having for its purpose the direction and protection of muscle structures, as shall be seen later, is characteristic of intermuscular connective tissue everywhere in the body. And yet, considering lymphatic tissue and capsule together, this elaboration has become so complex and purposeful as to constitute an organ of itself, a combined connective tissue—lymphatic tissue, pad-like organ, for certain definite purposes having to do on its physical side with the complicated muscular movements of this region.*

RELATION OF THE TONSIL TO THE PALATOGLOSSUS MUSCLE.

The palatoglossus muscle is in the cases examined small and relatively delicate, although, according to Dr. Makuen,[2] it becomes large in singers. It passes in a slightly outwardly bowed course from the side of the soft palate, downwards and forwards to its insertion at the side of the posterior part of the mouth portion of the tongue. Its position at the side of the throat is chiefly determined by its close attachment throughout its course to the under surface of a bridge of mucous membrane constituting the covering of the anterior pillar. The

***In this article, for reasons of simplicity, we have not attempted to differentiate the relative part played by the capsule of the tonsil and the lymphatic tissue in the physical purposes accomplished by the tonsil.**

bridge-like character of this layer of mucous membrane is due to its passage over from the lateral wall of the throat onto the surface of the tonsil, where it either merges indistinguishably into the mucous membrane covering the surface of the tonsil, or else ends in a fairly well defined border on the surface of that mucous membrane. (Figure I.) It is to be carefully noted that this bridge of mucous membrane depends on the tonsil for its inner support. (Figure II, A, B.) Dissecting up this bridge of mucous membrane one finds the palatoglossus closely attached to its under surface. Between the palatoglossus and the inner surface of the lateral wall is a small irregular unoccupied space, bounded below by the upper anterior border of the capsule of the tonsil, and above by the bridge of (removed) mucous membrane. To the outside is a loose fascia covering the inner surface of the superior constrictor. The anterosuperior border of the capsule (with its accompanying lymphatic tissue) presses upwards from below into this bridged space so as to be, to a greater or lesser degree, between the palatoglossus and the superior constrictor muscles. It is attached to the palatoglossus quite closely by short strands of connective tissue, while to the superior constrictor the connecting bands are longer. Thus the palatoglossus muscle is encased in a canal determined by the superior constrictor, the capsule of the tonsil and the mucous membrane bridge. Its direction of action is governed chiefly by the outward attachment of the bridge of mucous membrane, which prevents the muscle to a certain degree from straightening towards the lumen of the throat as it becomes shortened in action. The upper anterior border of the tonsil serves to protect the muscle from direct contact with the superior constrictor, especially during the relatively violent movements of swallowing and retching.

As one approaches the soft palate, since the muscle approaches more closely to the lateral wall of the mouth, this bridge of mucous membrane becomes narrower. Here the capsule of the tonsil does not rise so high as to lie between the palatoglossus and the lateral wall.

The dependence of the palatoglossus on the tonsil may be understood when we consider the situation of the muscle with

the tonsil removed. (Figure III, A, B.) Not only has the inner support to the bridge of mucous membrane been removed, but with it also the border of the tonsil which separated the palatoglossus from the superior constrictor muscle. The layer of mucous membrane supporting the palatoglossus has now, while still bearing the muscle, been transformed into an overhanging ledge. Nature's delicately complex plan for obtaining a perfect action of the muscle has been rudely undermined. The muscle is now in much the same predicament as a ship with a hopelessly injured rudder in a stormy sea and lying in the midst of a jagged rocky shore. The muscle, like the ship, is destined to be seriously shaken at the best, since its perfection of action cannot be hoped for excepting under essentially natural aiding conditions. The degree of the impairment of its function will depend on the strength of the mucous membrane ledge, on the extent of the dropping of the ledge from its former position, on the formation of scar tissue in and upon the muscle, and on the place and extent of adhesions formed between the muscle or ledge and the outer wall.

With the expanding effect of the tonsil removed, the breadth and outward curve of the superior constrictor diminishes (a process which is aided by the contraction of scar tissue); thus the perfection of action of the superior constrictor must be at any rate to some degree impaired. If the ledge of mucous membrane be both narrow and stiff, and if it lie in a favorable direction, these conditions may possibly save the muscle from the rocks of adhesion against the outer wall, even though the muscle cannot be saved from the inevitable scar tissue contraction and the retraction resulting from the almost inevitable sagging of the ledge. (Figure IV, A, B, C.)

By reason of the lack of supportive capability of the ledge of mucous membrane, or by reason of reparative or inflammatory swelling following the operation of tonsillectomy, or by reason of the traumatisms resulting from the violence of the movements of swallowing and retching, or by reason of these influences combined, contact between this mucous membrane ledge and the outer wall is apt to result in permanent adhesion. This adhesion might be slight or heavy, might extend over a small portion of the linear coures of the ledge, either anterior or posterior, or might be complete, in which

last case the palatoglossus would be lost in an adherent linear scar throughout its entire course. In case of partial adhesion a part of function of the muscle would be retained. Adhesion posteriorly in the vicinity of the soft palate would be more serious to the function of the palatoglossus than adhesion anteriorly or even near the middle of its course. If adhesion occurred to the palate, and should a part of the function of the muscle be retained, nevertheless the direction of even the partial action remaining would be so extremely altered outwardly as to be relatively ineffective; and, even worse, if resulting scar tissue pulled too hard, the neighboring palatopharyngeus might be pulled with the soft palate over against the outer wall. (Figures V, VI, VII, VIII, IX.)

THE RELATION OF THE TONSIL TO THE PALATOPHARYNGEUS MUSCLE.

The exit of the palatopharyngeus muscle from the soft palate occurs in close vicinity to, indeed is nearly identical with, the place of exit of the palatoglossus; but the two muscles upon emerging from the palate begin at once to diverge the one from the other. The size of the angle of divergence of these muscles is of considerable importance and varies approximately from thirty to fifty degrees. The palatopharyngeus is, relatively to the palatoglossus, a much larger and stronger muscle. It is flattened anteroposteriorly to a fan-like shape, and, extending at its lateral borders to the outer wall, serves as a continuation of the general surface of the soft palate downwards on each side. It passes downwards and backwards to a point opposite the base of the tongue, where it merges into the general muscular mass coursing along the anterolateral surface of the pharynx. In this study we shall not attempt to follow the muscle in its lower pharyngeal and laryngeal relations.

The tonsil appears to serve the palatopharyngeus in two important respects. In order to appreciate the first of these one should realize the thinness and feebleness of the bared curtain of muscle, as well as the fact that the lateral attachments of the muscle are fixed, while its central attachments in the soft palate are to a certain degree movable. The capsule of the tonsil lies against the lateral wall and curving inwards lies

also against the anterior surface of the palatopharyngeus muscle. (Figure X.) Thus the muscle is, as it were, braced with reference to the lateral wall, and thus is fixed in position; otherwise its thinness of structure would cause it to be liable, if subjected to undue muscular stress or to the pulling of inflammatory scar tissue, to sag towards the outer wall. With the tonsil removed the palatopharyngeus inevitably becomes endangered from any force, whether muscular or contraction of scar tissue, pulling the muscle in either direction. Should this lateral displacement result in close adhesions to the outer wall, not only might the muscle be impaired in its action or even be entirely prevented from functionating, but more important still, the palate might be so closely held down as to prevent its upward movement on phonation, in which case a permanent nasalized voice, due to operative rhinolalia aperta, would inevitably result.

The second purpose served by the tonsil to the palatopharyngeus is protective. This protection is most important at two points. The first of these is at the angle formed by the palatoglossus and palatopharyngeus as they emerge from the palate. Here the tonsil with its mucous membrane covering insinuates itself into the depths of this angle, thus preventing adhesion between the two muscles. Tonsillectomy by removing this protection exposes the muscles to the danger mentioned. The second point at which the protection of the muscle is especially important to the palatopharyngeus is the point of passage of the muscle into the pharyngeal wall. Here pharyngeal surface and muscle necessarily are in close association. If the tonsil were absent, either traumatic or inflammatory lesions would be much more likely to produce impairing injury to the muscle. In the operation of tonsillectomy, to remove the tonsil from the palatopharyngeus to this low point involves danger of adhesion, from injury to the tissues (for the capsule is here quite closely adherent) and from the inevitable scar tissue even without such injury. The danger is emphasized when one notes that the same phenomenon of adhesion occurs at this point in a mild degree not uncommonly through inflammatory processes, even in nontonsillectomized throats. In so far as the layer of mucous membrane which curves from behind the posterior pillar around its free border

on to the anterior surface of the pillar and so on to the surface of the tonsil is well preserved, will it help to perform the protective work of the tonsil; and its preservation, as has been remarked by others, is important.

Summarizing now the function of the tonsil with reference to the action of the depressor palatal muscles, as indicated anatomically, we find with reference to the palatoglossus muscle:

1. The tonsil plays with contiguous structures a necessary part in the creation of a channel for the muscle which determines its location, length, direction of action, and protection against injury through movement of adjacent muscles. If the tonsil be extirpated the muscle is left suspended beneath a thin ledge of mucous membrane, which, being unsupported at its inner border, is liable to the following fates: (1) Slight or moderate contraction and retraction of the ledge in both a lengthwise and a lateral direction; (2) marked retraction in a lateral direction, possibly without adhesion; although adhesion is very likely to occur, in which case there results (3) marked retraction with partial adhesion, either (a) anteriorly, or (b) posteriorly; or (4) adhesion to the lateral wall throughout its linear course.

With reference to the palatopharyngeus the tonsil plays a part less vital, to be sure, than that played for the palatoglossus, but nevertheless a part of great importance. Especially is this true in view of the larger size of the muscle and its important relation to the larynx. With the palatoglossus extirpation of the tonsil must result, at any rate theoretically, unless in cases of exceptional anatomy, in impairment of the action of the muscle, which usually must be serious in degree, and must often reach total disability. On the other hand (not considering injury due to scar tissue at the surface of the muscle, the seriousness of which we are unable at this time to estimate), serious impairment to the action of the palatopharyngeus following tonsillectomy, would result only through direct operative injury to its fibers, or through the dragging of the weakened muscle out of place by the pulling of an adherent anterior pillar, or by the pulling of scar tissue, or by being tied down by adhesions, or by any two, or by all of these factors combined. (Figure XI, A.) Extirpation of the tonsil might

result (1) in the sagging of the palatopharyngeus towards the outer wall; (2) in moderate adhesions at its point of entrance into the pharyngeal wall; (3) in marked adhesion to the lateral wall, thus largely incapacitating the muscle; (4) in the adhesions so dragging on the soft palate as to prevent its being raised against the pharyngeal wall for phonatory purposes.

STUDY OF TONSILLECTOMIZED THROATS.

We have carefully observed the tonsillectomized results in forty-three persons. The ages run from two to forty years; the operators number more than a dozen, most of them thoroughly experienced. We have tabulated the results according to the findings for each of the eighty-three tonsils operated. One factor which in tonsillectomy would inevitably tend to produce impairment in the action of the muscles concerned, that of the scar tissue formed on the bared surface of muscles, could not be estimated without microscopic study of tonsillectomized throats, and consequently has not been taken into consideration. The tabulation of the end results of tonsillectomy is as follows:

1. Neither the palatoglossus nor palatopharyngeus muscle shows more than slight retraction—i. e., both muscles appear essentially normal on both sides of the throat; three individuals; seven per cent.

2. Moderate retraction of the mucous membrane ledge (palatoglossus) in a lateral direction without evident adhesion; partial impairment of action of muscle; fifteen tonsils; eighteen per cent.

3. Marked retraction of the mucous membrane ledge (palatoglossus) in a lateral direction, but without evident adhesion; considerable impairment of muscle; seventeen tonsils; twenty-one per cent. (Figure VII.)

4. Marked retraction of the mucous membrane ledge (palatoglossus) in a lateral direction, with adhesions (a) anteriorly; decided impairment of muscle; five tonsils; six per cent (Figure VII); and (b) posteriorly; total incapacitating of muscle; thirteen tonsils; fifteen per cent. (Figure VIII.)

5. Adhesion of the mucous membrane ledge (palatoglossus) throughout its entire linear extent; total incapacitating of

muscle; twenty-four tonsils; twenty-nine per cent. (Figure IX.)

6. Palatopharyngeus appears normal or nearly normal; sixty-three tonsils; seventy-four per cent.

7. Slight or moderate pulling of palatopharyngeus towards lateral wall with adhesion; partial impairment of muscle; eleven tonsils; thirteen per cent. (Figure XI, B.)

8. Marked adhesion of the palatopharyngeus to the lateral wall; decided and possibly total incapacitation of the muscle; six tonsils; seven per cent. (Figure XI, A.)

It seems conservative to say that following tonsillectomy the palatoglossus and palatopharyngeus muscles are never wholly normal in their action. A striking fact concerning the appearance of the pillars in nontonsillectomized throats is a certain ease and freedom of movement, due to the provision of an abundant amount of tissue, allowing for full, easy range of action. This picture in tonsillectomized throats is altered for one of deficiency of tissue and tenseness of action.

The agreement of the findings above of the results of tonsillectomy, with the anatomic indications of the function of the tonsil with reference to the depressor palatal muscles, need hardly be pointed out. Anatomically the tonsil seems vital to the action of the palatoglossus; and in the tonsillectomized throats, the muscle is found to be to the eye practically normal in only eighteen per cent, impaired in forty-five per cent, and totally incapacitated in thirty-nine per cent. Anatomically the tonsil appears important to the perfection of action, though not vital to the function, of the palatopharyngeus, and in the tonsillectomized results it is found normal to the eye in seventy-four per cent, and impaired in nineteen per cent.

It has seemed to us best in this article to confine ourselves to the one question of the part played by the tonsil in the action of the depressor palatal muscles. The all important question of the danger of tonsillectomy to the voice, whether the speaking or the singing voice, necessarily is closely involved in the matter under discussion. The subject of the voice in this connection is, however, far from simple, and too important to be casually dealt with. It goes without saying that one who undertakes an operation necessarily so hazardous to the action of the depressor palatal muscles, as indicated by the findings

just reported, is playing with fire so far as the voice, and especially the singing voice, is concerned. We feel that it might create a wrong impression, however, if we did not at any rate tabulate the voice cases included in the above list of tonsillectomized throats.*

Speaking voice apparently unimpaired: thirty-eight individuals, eighty-eight per cent; speaking voice showing rhinolalia aperta (open nasaling), due apparently to marked tension exerted on the soft palate by close adhesions of the palatopharyngeus to the lateral wall: three individuals; seven per cent; speaking voice impaired, but apparently not due to the operation: two individuals, five per cent; singing voice impaired (as to high pitched notes only): one individual, two and five-tenths per cent. It should be added that in two individuals (five per cent) a "drawing sensation" in the tonsil region was present; the sensation in one case, a young woman of twenty-two years with much scar tissue, was highly annoying.

SUMMARY AND CONCLUSIONS.

1. The tonsil serves as an absolutely necessary factor in providing a channel for the action of the palatoglossus muscle.

2. The function of the tonsil with reference to the palatopharyngeus is to afford support and protection of great importance to its normality of action.

3. Tonsillectomy serves to destroy not merely a possible lymphatic function of the tonsil, but also to either disturb or destroy an important physicomechanic function, one which is capable of being clearly understood.

4. More or less impairment of action of the depressor palatal muscles must occur in practically all cases following tonsillectomy, regardless of the delicacy of operative technic or the particular form of operative procedure adopted; but delicacy of procedure and method of operation are not, of course, to be considered unimportant.

5. To consider the present operation of tonsillectomy as a final settlement of the operative approach to the tonsil is pre-

*We have left out of consideration entirely one case of badly injured palate with marked impairment of the speaking voice; the case is highly suggestive, however, of the dangers to the voice from so difficult and radical an operation in the hands of the untrained.

mature and erroneous. The whole tonsil question requires further anatomic, pathologic and operative study, in order, if possible, to readjust the operative approach to the organ to the new knowledge which is accumulating.

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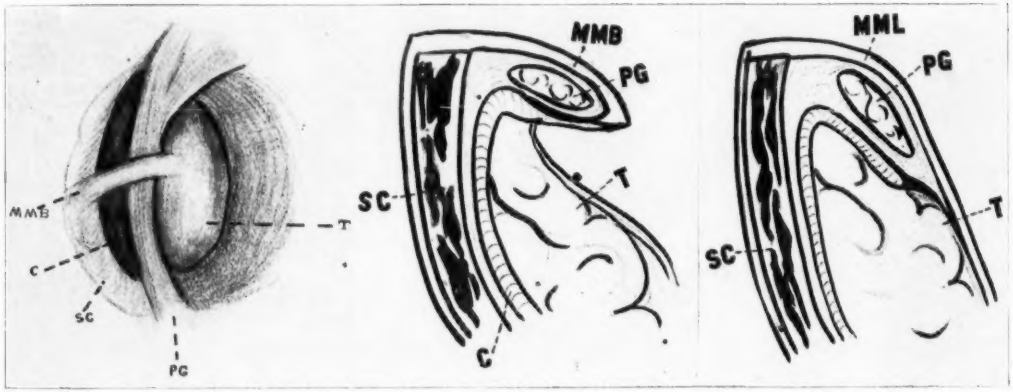

Fig. I. Fig. II A. Fig. II B.

Fig. I. Drawing from dissection, showing relations of palatoglossus muscle. P. G., palatoglossus; T, tonsil; C, anterosuperior border of capsule of tonsil; SC., superior constrictor muscle; MMB, a section of the "mucous membrane bridge," which elsewhere in the drawing has been removed.

Figure II, A and B. Showing diagrammatically in cross section the structures and relations which determine the action of the palatoglossus. In A the amount of tonsillar lymphatic tissue is small, in B large: T, tonsil; PG, palatoglossus muscle; MMB, "mucous membrane bridge"; SC, superior constrictor muscle; C, anterosuperior border of capsule of tonsil.

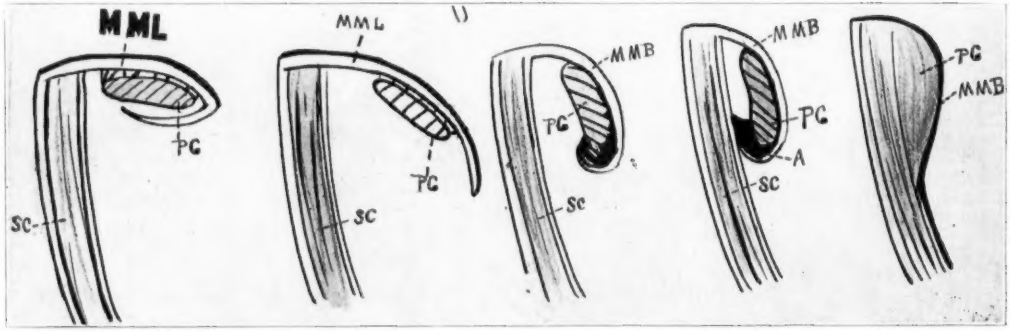

Fig. III A. Fig. III B Fig. IV A. Fig. IV B. Fig. IV C

Figure III, A and B. Showing the predicament of the palatoglossus muscle after the tonsil has been extirpated. These figures correspond respectively to A and B of Figure II. PG, palatoglossus; MML, "mucous membrane ledge,"; SC, superior constrictor muscle.

Figure IV, A, B, C. Showing the possible final fates of the palatoglossus following total extirpation of the tonsil. A, retraction of "mucous membrane ledge" with the palatoglossus; B, palatoglossus adherent to outer wall; C, identity of PG and "mucous membrane ledge" completely lost in a mass of adherent scar tissue; PG, palatoglossus; SC, superior constrictor; MMB, "mucous membrane ledge."

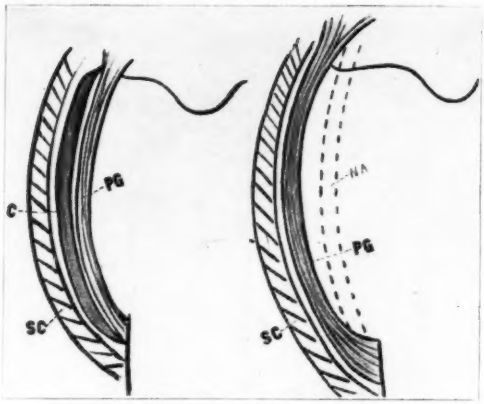

Fig. V. Fig. VI.

Figure V. Showing normal direction of action of palatoglossus muscle, and normal relation of anterosuperior border of the tonsillar capsule to the palatoglossus and superior constrictor muscles. PG, palatoglossus; C, anterosuperior border of tonsillar capsule; SC, superior constrictor.

Figure VI. Showing position of palatoglossus muscle following total extirpation of tonsil, due to retraction of "mucous membrane ledge"; adhesions of palatoglossus to outer wall absent. NA, normal direction of action of palatoglossus; PG, palatoglossus; SC, superior constrictor; A, adhesion.

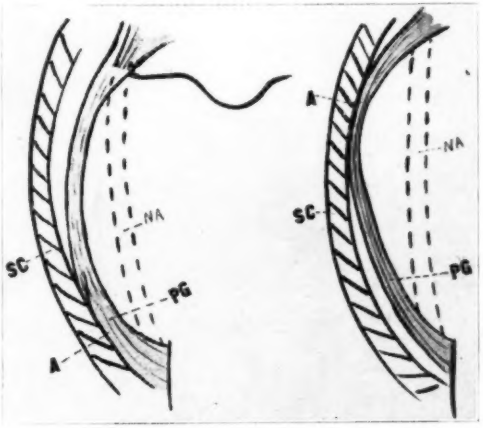

Fig. VII. Fig. VIII.

Figure VII. Showing adhesion of palatoglossus to outer wall following total extirpation of tonsil, in anterior portion only. (For lettering see Figure VI.)

Figure VIII. Showing adhesion of palatoglossus to outer wall following total extirpation of tonsil; adhesion at palatal end only. (For lettering see Figure VI.)

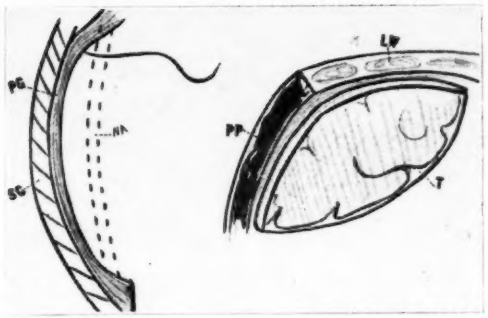

Fig. IX. Fig. X.

Figure IX. Showing complete adhesion of palatoglossus to outer wall following extirpation of tonsil. (For lettering see Figure VI.)
Figure X. Showing the manner in which the ton il acts as a supporting brace to the palatopharyngeus muscle. LW, lateral wall; PP, palatopharyngeus muscle; T, tonsil.

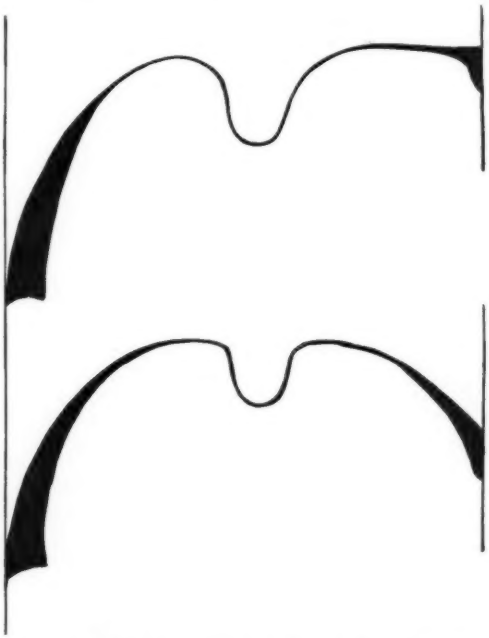

Figure XI. Diagram showing the result of adhesions of the palatopharyngeus to the outer wall. A, marked; such cases are liable to permanent impairment of the speaking voice. B, moderate; might occur from too low dissection of capsule.

L.

INVOLVEMENT OF THE LABYRINTH BY WAY OF THE DUCTUS ENDOLYMPHATICUS

By Norval H. Pierce, M. D.,

Chicago.

Reports of cases of infection of the saccus secondary to labyrinthine suppuration are very numerous, the labyrinth, in such cases, being involved through a fistula of the horizontal semicircular canal, the fenestrum ovale, or the promontory. The inflammatory process, spreading to the ductus cochlearis, thence through the ductus endolymphaticus, invades the saccus, and there forms a larger or smaller accumulation of purulent material.

This has been thought to be one of the paths by which cerebellar abscess may originate, but most frequently the end result is a sub- or an intradural abscess, as the sac has a far greater tendency to burst toward the bone than toward the arachnoid space.

Involvement of the labyrinth secondary to inflammation of the saccus, or by way of the ductus endolymphaticus, is very difficult to prove postmortem; the literature on the subject is, therefore, very meager. Cases have been reported in which there has been found no demonstrable fistula in any of the semicircular canals, the footplate of the stapes, or the promontory, and in which the labyrinthine suppurative process has eventuated in a fatal meningitis, the saccule having been proved, microscopically, to have been involved directly from the bone upon which it lays, this having become softened in the course of an acute or chronic mastoiditis, or in the course of a sigmoid sinus thrombosis.

During the last five years I have had two cases which had about the same characteristics and which were as follows:

Acute mastoiditis, following an attack of acute otitis media suppurativa. After subsidence of the initial otitic symptoms in the course of a month, they displayed temperature, more or less constant; absence of marked external tenderness and infiltration, headache, corresponding to the side of the ear involved; decrease in bone conduction; a slight decrease in air conduction, giving a positive Rinne; marked lowering of the upper tone limit, with preservation of the lower tone limit; nystagmus, rotatory in character, to both sides—that is, to the sound and the diseased side—when the eyes turned in these directions. The static labyrinth responded to the caloric tests; there was no stiff neck, no Kernig, no Babinski; but the spinal fluid was somewhat turbid, the cell count being increased from two hundred to five hundred per centimeter.

In the course of a simple mastoid operation marked softening of the temporal bone upwards and backwards was found. In both cases the tegmen antri could be removed with a sharp spoon. As far as could be ascertained upon the table, there was no fistula leading to the superior or horizontal semicircular canals.

The cases followed the usual course of healing, without any further disturbance, the meningeal tension ceasing in the course of three or four days, the nystagmus disappearing at the end of a week.

In my own mind I had explained these symptoms of labyrinthine irritation by assuming that inflammation of the dura had spread down to the eighth nerve and had caused the irritative symptoms of the static apparatus.

A recent case, however, has thrown some light on the subject. While, as in the two cases previously mentioned, the third resulted in recovery, thus excluding autopsy proof, the strong presumptive evidence would seem to indicate that the saccus endolymphaticus may have been involved in a plastic inflammation, producing severe disturbance of the labyrinth and symptoms of beginning meningitis. I will briefly relate the history:

Mr. E. O. B., lawyer, thirty-six years of age, entered St. Luke's Hospital, January 21, 1916, on the service of Dr. Theobald. He was a thin, pale man and had suffered from a severe double otitis media which followed an attack of grippe

beginning January 1st. This was probably the first trouble he had ever had with his ears. Paracentesis was performed on both ears two days after the onset of the trouble. He had had scarlet fever, the usual diseases of childhood, and chronic ethmoiditis. Family history negative.

There was no pain on deep pressure over the mastoid and no swelling; there was a purulent discharge, considerable in amount, from both ears. The blood count was 8400 whites, sixty-eight per cent polymorphonuclears. The temperature ranged from 100° to 102.6°. Urine, sugar and albumin absent; microscopic examination negative.

The ear was packed with gauze, and a fifty per cent alcohol dressing applied. The temperature chart is displayed herewith, and may be consulted by those who wish to see for themselves.

While the temperature improved, the discharge continued until February 1st, when the temperature began again to mount up. The patient then complained of headache; had sleepless nights; his general condition was less favorable than when he entered the hospital; his tongue was furred; he was constipated. There was a trace of albumin, but no casts. In spite of the absence of mastoid swelling and of tenderness and pain over the mastoid, I advised operation. Skiagraphs taken on February 2d disclosed nothing definite.

In pursuance of this advice, on February 4th I opened both mastoid processes, under gas. There was a small amount of pus in each mastoid, in the region of the tip cells. There was no fistula in either external semicircular canal, but on the right side I found an area of softened bone, which could be easily removed with the curette, extending inward and backward around the region of the labyrinth, to a point above the upper border of the sigmoid sinus. The meninges were uncovered to the extent of about one-half centimeter. The dura looked hyperemic and slightly thickened.

The patient did not do very well after the operation. The various laboratory examinations will be found elsewhere. If you will consult the temperature curve, you will find that the temperature did not return to normal, but continued for some days to range from 100.5° to 99° and 98.8°. On February 13th the temperature was normal, the wound discharged freely,

and there was a discharge from the external auditory canal. On February 17th the temperature began to mount to 100° and 100.5°.

He ran along thus until March 1st, when he complained of a sensation of dizziness and of being nauseated. The temperature on this day varied from 98.6° to 101°. The dizziness, nausea and vomiting increased during the day, so that he was unable to change position in bed, but remained on his left side. Every attempt to change position resulted in a violent attack of vomiting, acompanied by diaphoresis.

When I saw him the next day he had a violent nystagmus of the third degree to the left. The right static apparatus did not respond to caloric tests, and he was unable to hear a Bezold small a^1 fork when the noise apparatus was held in the left ear. He complained a good deal of deafness, headache, and indefinite stiffness about the neck. There was no Kernig and no Babinski, but there was marked photophobia. Pus from the ear showed hemolytic streptococcus; staphylococcus albus. On March 6th, spinal fluid showed Nonne strongly positive; Lange positive; cell count 95 per centimeter; culture negative; no sugar. On March 8th, Nonne strongly positive; Ross Jones strongly positive; Lange positive; cell count per centimeter, 973; polymorphonuclears, ninety-five per cent; cultures negative; sugar negative. The blood count throughout is given below.

EXAMINATION OF BLOOD.

Quantitative.

January 21, 1916—Leucocytes per c.m.....	8,400

Differential Count.

Lymphocytes:	
(a) Small	23
(b) Large	4
(c) Indentate nucleus	3
Neutrophiles:	
(a) Polymorphonuclear	68
Eosinophiles:	
(a) Polymorphonuclear	1
Basophiles	1

Quantitative.

January 22, 1916—Leucocytes per c.m.....	11,700

Differential Count.

Lymphocytes:	
(a) Small	16
(b) Large	6
(c) Indentate nucleus	1
Neutrophiles:	
(a) Polymorphonuclear	75
Basophiles	2

Quantitative.

January 23, 1916—Leucocytes per c.m.....	8,300

Differential Count.

Lymphocytes:	
(a) Small	23
(b) Large	2
(c) Indentate nucleus	2
Neutrophiles:	
(a) Polymorphonuclear	73

Quantitative.

January 24, 1916—Leucocytes per c.m.....	8,600

Differential Count.

Lymphocytes:	
(a) Small	20
(b) Large	6
Neutrophiles:	
(a) Polymorphonuclear	70
Eosinophiles:	
(a) Polymorphonuclear	2

Widal negative.

Quantitative.

January 25, 1916—Leucocytes per c.m.....	7,000

Differential Count.

Lymphocytes:	
(a) Small	24
(b) Large	3
(c) Indentate nucleus	1
Neutrophiles:	
(a) Polymorphonuclear	71
Eosinophiles:	
(a) Polymorphonuclear	1

Quantitative.

January 27, 1916—Leucocytes per c.m.	7,200

Differential Count.

Lymphocytes:	
(a) Small	27
(b) Large	6
Neutrophiles:	
Polymorphonuclears	65
Eosinophiles:	
Polymorphonuclears	2

Quantitative.

January 31, 1916—Leucocytes per c.m.	8,000

Differential Count.

Lymphocytes:	
(a) Small	25
(b) Large	7
Neutrophiles:	
Polymorphonuclears	67
Basophiles	1

Quantitative.

February 17, 1916—Erythrocytes per cm.	3,800,000	
Leucocytes per c.m.	6,400	
Hemoglobin (method)	63	Sahli

Differential Count.

Lymphocytes:	
(a) Small	26
(b) Large	2
(c) Indentate nucleus	2

Neutrophiles:		
Polymorphonuclears	68	
Eosinophiles:		
Polymorphonuclears	2	

Quantitative.

February 24, 1916—Erythrocytes per c.m.	4,290,000	
Leucocytes per c.m.	9,000	
Hemoglobin (method)	68	Sahli

Differential Count.

Lymphocytes:		
(a) Small	24	
(b) Large	4	
(c) Indentate nucleus	1	
Neutrophiles:		
Polymorphonuclears	70	
Basophiles	1	

Quantitative.

March 1, 1916—Leucocytes per c.m.	9,000	
March 2, 1916—Erythrocytes per c.m.	3,880,000	
Leucocytes per c.m.	10,200	
Hemoglobin (method)	64	Sahli

Differential Count.

Lymphocytes:		
(a) Small	20	
Neutrophiles:		
Polymorphonuclears	80	

Quantitative.

March 5, 1916—Leucocytes per c.m.	10,400	

Differential Count.

Lymphocytes:		
(a) Small	16	
(b) Large	3	
(c) Indentate nucleus	2	

Neutrophiles:	
Polymorphonuclears	78
Eosinophiles:	
Polymorphonuclears	1

Quantitative.

March 11, 1916—Erythrocytes per c.m.	4,080,000	
Leucocytes per c.m.	6,700	
Hemoglobin (method)	66	Sahli

Quantitative.

March 22, 1916—Leucocytes per c.m.	9,200

In the left ear he complained of great tinnitus. The audition in this ear was also very much impaired, but it responded to caloric stimulation. The trouble was evidently in the right labyrinth, and the laboratory findings indicate a beginning meningitis. At this time the labyrinth operation was very seriously considered. The temperature, March 6th, was 102.6°. However, on the following day his general condition seemed to be a good deal improved, the pain in the head had subsided, the temperature was lower, and the dizziness and vomiting were markedly less.

From this time on, with the exception of a few days, when there were occasional pains in the left ear necessitating the opening of the drum head, he continued to improve. He was discharged March 27th. He is now performing his duties. An examination, just before I left home, showed that he could hear the small a^1 forks, could distinguish spoken numerals about two feet from the right ear, with the noise apparatus in the left ear, demonstrating that function was returning.

We have here, therefore, a serous labyrinthitis resulting in a serous meningitis, occurring in an acute otitis media twenty-seven days after the mastoid operation, and fifty-two days after the onset of the ear rtouble.

What of the presumptive evidence that involvement of the labyrinth occurred by way of the ductus endolymphaticus? The labyrinth is involved scarcely ever through the semicircular canals in acute otitis media. The exceptions are cases of

acute mastoiditis occurring in the course of severe scarlet fever, and in cases where there is a dehiscence of the external semicircular canal. As we had the opportunity to inspect the external semicircular canal, we may at least exclude this canal from macroscopic changes. This may be said also regarding the posterior and superior canals, which may also be excluded as gateways of infection, as there was healthy bone lying between them and the softened fistula which led to the posterior surface of the temporal bone. It is hardly possible that it could have occurred by way of the footplate of the stapes, or the fenestra ovalis, as the ear was drained thoroughly both by paracentesis through the tympanic membrane and posteriorly into the mastoid wound. The same may be said of the promontory.

If there had been a dehiscence of the external semicircular canal, which is very rare in adult life, or a dehiscence in the promontory, which is still more rare, the symptoms of involvement of the labyrinth would have occurred much earlier in the course of the disease.

The softened bone which I mentioned as having been present at the time of operation in the right ear, which was later involved in the labyrinthine trouble, extended directly to the meninges, which were very close to the situation of the aqueductus vestibuli. This I ascertained by boring several healthy bones in the direction taken by the fistula, finding that they very closely approximated the neighborhood of the saccus endolymphaticus.

In conclusion, I would emphasize a few points:

1. That the saccus endolymphaticus may be involved more frequently than is usually supposed in acute softening processes of the mastoid.

2. That it is our duty in all cases of mastoid involvement without external manifestations except temperature, to very thoroughly search for softened areas deep down in the bone, and not cease until we come to healthy structure.

3. That we should always bear in mind in suppurative labyrinthitis not only to open into the bony labyrinth, but to explore the region in which the saccus endolymphaticus is situated.

4. That within the first few days serous labyrinthitis cannot

be differentiated from suppurative labyrinthitis by any diagnostic means at present at hand.

5. That absence of globulin, presence of lactic acid, absence of sugar, may be noted in inoffensive serous meningitis.

6. That in these three cases viable microorganisms were not recovered from the cerebrospinal fluid, which, in my opinion, is the only differentiating point between spreading suppurative meningitis and serous or circumscribed meningitis.

7. Several lumbar punctures were made in the course of the week following the appearance of meningeal symptoms; that is, whenever the headache, stiffness of the neck and temperature increased. These punctures were invariably followed by improvement, as evidenced by decrease in headache, stiffness of neck, and temperature.

LI.

REPORT OF A CASE OF SYRINGOMYELIA WITH MARKED VESTIBULAR SYMPTOMS.*

By G. E. Shambaugh, M. D.,

Chicago.

An important chapter has been added to otology by the recent studies in the physiology of the vestibular part of the inner ear and by the analysis of the symptoms arising from disease of this mechanism. The pursuit of these studies has led the otologist into an examination of the symptoms arising from disturbance of the central tract of the vestibular impulses, and has thus brought his work into close relation with that of the neurologist. In making a diagnosis of intracranial lesions the neurologist can often be assisted by the intelligent cooperation of the otologist.

In our studies of the vestibular mechanism we have already arrived at a satisfactory working basis for the interpretation of the symptoms arising from disease of the labyrinth and for the diagnosis of the several forms of labyrinth disease. On the other hand, in the interpretation of the vestibular symptoms arising from disease of the central nervous system, and in the diagnosis of these central lesions, we have made scarcely more than a beginning. We are still apparently on the threshold of what is to be a most valuable field for work. For these reasons it is still of great importance that cases should be reported where a diagnosis of disease of the central nervous system can be established, and in which there are distinct vestibular symptoms. These considerations have led me to report here the following case of syringomyelia producing symptoms arising from disturbance of the vestibular tract.

The case is that of a young man, aged twenty-eight years, a mining engineer, who was referred to me in September, 1915, because of a disturbance of equilibrium and sensations of ver-

*Read before the American Otological Society, Washington, D. C., May, 1916.

tigo. He dates the onset of his difficulty two years ago, since when he has suffered most of the time from headache, chiefly occipital. The disturbance of equilibrium consists of a sense of instability when walking, associated with some sensation of vertigo and occasional slight nausea. Ever since the onset of this trouble he has experienced much difficulty in reading. He discovered that in order to read at all it became necessary for him to hold the paper far over to one side. At the same time he would turn his face in the opposite direction. Only in this way, by making as strong a deviation of the eyes as possible, was he able to read. The side toward which the eyes had to be directed was not always the same, sometimes being to the right, at other times to the left. This change of sides often came on at short intervals. He would discover while reading with the book held over to one side, that the page became blurred, and that by holding the book over to the opposite side he would again be able to read. At no time had he noticed any tinnitus aurium or any difficulty in hearing.

In making an examination of his ears the drum membranes were practically normal, and the functional examination disclosed normal hearing in both ears. There was spontaneous nystagmus present on looking straight ahead. The eye movements were rather coarse and chiefly in the horizontal plane. The direction of the nystagmus was now toward one side, now toward the other, with but a few seconds' interval, during which the eyes would remain quiet. On deviation of the eyes toward the side of the quick component the nystagmus became much more marked. Deviation of the eyes toward the slow component changed the character of the nystagmus. The movements became less marked, and the quick component was directed toward the side of the deviation. It was found that his difficulty in reading was due to the violent spontaneous nystagmus, and the deviation of the eyes, now to one side, now to another, while reading, was an effort to reduce to its minimum the ever-present spontaneous nystagmus. For example, it was noticed that when the spontaneous nystagmus was directed toward the right, he would hold the book over to the left.

On making the rotation tests, it was noticed that when rotated toward the side of the slow component of the spon-

taneous nystagmus, this nystagmus was very much increased, and this increase seemed to last about a minute and a half before subsiding. When rotated toward the side of the quick component, the resulting after-nystagmus was much less violent, and was directed to the opposite side. This after-nystagmus would usually continue about one minute before it would cease, and there would be a return of the preexisting spontaneous nystagmus toward the opposite side.

Caloric stimulation, cold water, head erect, produced in either ear a ready response. The resulting nystagmus, while directed always toward the opposite side, differed from the normal reaction in that the character of the nystagmus was chiefly horizontal and only very slightly rotary.

The pointing tests also gave abnormal responses. The spontaneous pointing, shoulder from above, for both the right and the left hand, was normal, irrespective of the existing spontaneous nystagmus. After caloric stimulation (cold) of the right ear, pointing for the right hand, shoulder from above, produced a deviation to the right of only four to five inches, while for the left hand there was no deviation at all. Caloric stimulation of the left ear (cold), shoulder from above, both right and left hand touches. Here, in spite of the marked nystagmus to the right, no past pointing to the left was produced.

Pointing tests after rotation also failed to give the normal past pointing. After rotation to the right, pointing shoulder from above, the right hand showed past pointing to the right of only four inches, while for the left hand there was no past pointing. After rotation to the left, no past pointing for either hand could be produced.

The absence of any hearing defect in this case and the fact that both rotation and caloric stimulation resulted in a prompt response from the vestibular apparatus, showed clearly that the vestibular symptoms did not arise from disturbance in the internal ear, but was due rather to some intracranial lesion. The shifting of the spontaneous nystagmus toward either side was also clearly not the result of a peripheral disturbance, but could only be accounted for on the basis of some central disease. The failure to get the normal past pointing after stimulation of the peripheral mechanism, by either caloric stimula-

tion or after rotation, was also clearly the result of some disturbance of the central tract of the vestibular impulses. In a case where there is no disease of the central tract, any disturbance of the peripheral mechanism which results in a disturbance of equilibrium is likely to produce spontaneous past pointing. This spontaneous past pointing will be toward the side to which the disturbance of equilibrium inclines the patient to fall. The past pointing will, in other words, be toward the side to which the slow component of the existing nystagmus is directed. For example, in a case where the disturbance of equilibrium is caused by the sudden suppression of function in one labyrinth, the tonus impulses from the opposite side, acting without the restraint of the normal tonus from the destroyed ear, will tend to throw the patient toward the affected side, and the slow component of the existing nystagmus will also draw the eyes toward the affected side. In the same way, while making the pointing tests in such a case, the arm will obey the same impulse, affecting all the other skeletal muscles, and there will be a spontaneous past pointing toward the affected side. Again, when in a normal case we produce a disturbance of equilibrium by disturbing the normal flow of impulses from the two ears, whether by means of rotation or by caloric stimulation, the induced past pointing will be toward the side to which the patient is inclined to fall—that is, toward the side to which the slow component of the nystagmus is directed.

When we come to the cases of disturbed equilibrium resulting from diseases of the central tract of the vestibular nerve, the past-pointing often fails to conform to the above simple rules. In the case here reported, for example, the existence of a strong spontaneous nystagmus failed to produce spontaneous past pointing as it would probably have done had the nystagmus been due to a disease in the peripheral mechanism. Moreover, the stimulation of the peripheral mechanism by rotation and by cold water, while it produced a marked nystagmus, did not bring out the typical past pointing.

When it became clear that the disturbance in equilibrium in this case was the result of the disease in the central nervous system and not of the peripheral mechanism of the labyrinth, I requested Dr. Thor. Rothstein, a neurologist, to make an

examination and determine the probable nature of the lesion. Dr. Rothstein discovered the case to be one of syringomyelia, with the extension of the lesion upward into the region of the fourth ventricle. The report of this examination is here appended:

DR. ROTHSTEIN'S REPORT.

"The patient states that he has enjoyed good health up to two years ago, when his present trouble started to develop. Many years ago he had observed that he could stand without discomfort much hotter and colder baths than other people. Six years ago he noticed that pinching of the skin did not cause pain over an area larger than the size of his hand and located on the left side, at the level of the heart region. Up to two years ago he was able to perform his work without any trouble, but at this time he started to become tired doing his work. He had to climb ladders in the mine, and he has found this tired him more and more during the last two years, and his mother states that she noticed a marked change in him during the last two years. He is more easily tired and does not laugh as heartily as he used to. Gradually some disturbance in walking has developed. He cannot handle his legs as easily as he used to and he has some vertigo. Also it has become difficult for him to read. (See description of nystagmus.) He suffers at times from headaches, but they are never severe, and he also has some pain in the back when tired.

"Physical Examination.—He is a well developed man and muscular. No paralysis of any muscles of the body exists. No atrophy of the muscles. Although he can walk, as it seems, unhindered, the legs are slightly dragged and are kept adducted, but his steps are of about the normal length. With the exception of the nystagmus, nothing abnormal is found about the eyes, pupils reacting to light and accommodation and the eye grounds being normal. Triceps, radial and ulnar reflexes lively and present on both sides. Patellar reflexes increased. Ankle clonus slight on both sides. Plantar reflexes present. Babinski reflex at times on both sides. Cremasteric reflex present. Abdominal reflexes lost on left side but present on the right. There is a slight resistance to passive movement of the legs, but this is not marked.

SENSATION.

"Sensation to Touch.—Right side of body: Sensation to touch is normal.

"Left side of body: Sensation to touch is considerably decreased, but not entirely lost, over an area extending between the level of the mammila and the level of the lower border of the thorax. It is less markedly decreased between this last level and the level of the crista ilii, and only slightly decreased over the area innervated by the second and third lumbar roots. On the rest of the left side of the body sensation to touch is normal. The decrease in sensation to touch is found both anteriorly and posteriorly.

"Sensation to Pain.—Right side of body: Sensation to pain is normal.

"Left side of body: Sensation to pain is lost entirely over an area between the level of the mammila to level of the lower border of thorax. It is markedly decreased over the area between the level of the lower border of the thorax and crista ilii and over the area of the second and third lumbar roots. It is also slightly decreased between the level of the mammila and the level of the clavicula. The decrease in sensation to pain is also found both anteriorly and posteriorly.

"Sensation to Temperature.—Right side of body: Twenty-four degrees Centigrade is felt cold all over right side, but sensation to warmth is markedly decreased over an area between the level of the clavicular and lower border of thorax, and also decreased over ulnar half of right arm and hand.

"Left side of body: Sensation to temperature is practically lost over whole left half of trunk, with the exception of above level of second rib. It is markedly decreased over the area of second and third lumbar roots and ulnar half of left arm. The sensation to temperature, furthermore, is not quite normal on the neck and back of head, but is normal over area innervated by trigeminus.

"Wassermann on blood and spinal fluid is negative. In spinal fluid were found seven cells to cubic millimeter. Nonne test negative and Lange test negative."

CONCLUSIONS.

It is evident that a long-standing disturbance of sensation to temperature (see history), the present marked disturbances of sensation to temperature and pain, and the much less marked disturbances of sensation to touch, make a diagnosis of syringomyelia the only one possible. The condition of the reflexes, as well as the slightly marked motor disturbances, conform well to this diagnosis. The history and the condition of the spinal fluid excludes syphilis. The decrease in sensation to temperature over the neck and back of head, demonstrates that this syringomyelic process has reached up to the medulla oblongata. It is therefore quite natural to assume that the nystagmus in this case depends upon an extension of the syringomyelic process up into the region of the fourth ventricle (syringobulbia). Nystagmus has been described in syringomyelia by many authors (Grund, Thomas, Monro, Köliechen, McLaren, Bárány, and others), and in some cases as the only present supramedullary symptom. In Bárány's cases (two) there existed strong spontaneous nystagmus, but without inhibition nystagmus.

LII.

MASSAGE OF THE EUSTACHIAN TUBE.*

By Alfred Lewy, M. D.,

Chicago.

Since the advent of the nasopharyngeal speculum and the nasopharyngoscope, considerable progress has been made in the treatment of diseases of the ear dependent upon lesions of the eustachian tube and its immediate neighborhood. But while the removal of growths, breaking up of adhesions, bougieing and topical applications have attracted the attention of the inventors of these instruments, and that of others, so far as I could find, only casual mention was made in medical literature of massage of the eustachian tube until the subject was taken up last year by P. J. Mink of Utrecht, Holland.[1] For some time the osteopaths have been practicing massage of the tube by the finger, and claiming excellent results in some forms of deafness, but I have been unable to follow their diagnoses as described in their journals.

Mink describes his technic in detail, and reports a number of cases so treated. He believes this treatment will prove a valuable addition to our therapeutic resources. After a limited experience I believe likewise, but realize, of course, that it is useful only in properly selected cases, as an addition to, but not a substitute for other well established procedures.

The technic is easily carried out by anyone familiar with the use of the eustachian catheter. A nasal applicator is curved to about the same degree as an eustachian catheter, but a shorter segment of the curve is used. A number of different lengths of curve are necessary to fit septal deviations and various anatomic conditions. Mink uses a wire looped back on itself in opposite directions at either end, and curved to fit individual cases. One

*Read before the Chicago Layngological and Otological Society, April, 1916.

end serves as a handle, the other as a cotton carrier. The cotton is best folded back on itself and wound around the carrier so as to form a thick ball rather than a brush, to avoid trauma. After cocainizing the region of the mouth of the tube (by the same motion as hereinafter described), the cotton-wound applicator is passed back to the posterior wall of the pharynx, swept upward in the fossa of Rosenmueller, brought forward over the mouth of the tube and immediately downward and back under the mouth of the tube. This motion is repeated about twenty times, or as often as the operator's judgment indicates. This movement Mink describes as his "Greater stroke" (Grosser strich). Another movement he calls the "Lip stroke" (Lippenstrich). For this stroke the applicator is rotated upward and backward into the mouth of the tube, as is done in passing the catheter directly in. This dilates the mouth and exercises the muscular and other attachments. Still another movement is the "Small stroke" (Kleinerstrich), which is reserved for the cases in which he is unable for any reason to circle the mouth of the tube. This stroke is up and down in front of the tube. The cotton should be in fairly firm contact with the tissues throughout the movements. He does not describe the use of medicaments in connection with the massage, but in the cases so treated I used argyrol twenty per cent, iodoglycerin one-half per cent and ichthyol ten to twenty per cent. The latter, while useful, is, of course, disagreeable in taste and smell, besides being more irritating in the nasopharynx than in the nose.

The cases which I shall report were not selected especially because they were appropriate for this treatment, but rather for the variety of conditions on which it was tried.

Six cases of acute suppurative otitis media in which massage with argyrol was begun when acute symptoms had subsided and they were in the declining or stationary stage. I believe these cases were shortened in their course and hearing restored more rapidly than with simple inflation and topical applications as heretofore used.

One case of acute suppurative otitis media, with visible, pinhead size perforation, anterior inferior, apparently became dry and then relapsed after three weeks of treatment, since which I have not seen the patient. This patient also had moderate

crusting, not of the ozenic type, in both nasal cavities, the source of which I had not discovered up to the last treatment.

Three cases of simple tubal catarrh of moderate degree yielded to a very few treatments.

Several more complicated cases I shall report in greater detail.

Case 11.—The result in this case was perhaps the most striking of all of them. The patient, a physician, aged fifty-three years; deafness many years, due, I believe, to a nerve degeneration plus tubal inflammation. He suffered from tinnitus, an almost constant feeling of fullness, squeaking noises on blowing nose or swallowing, and autophonia of such degree that it sometimes interfered with his business. He had suffered much at many hands, including my own, and had been applicated, bougied, and the socalled adhesions in the fossa of Rosenmueller broken up, but with no permanent relief. Massage of the tube, first with argyrol, later with ichthyol, about ten treatments, have given him marked relief. There have been no treatments for about six weeks, and no return of symptoms in spite of frequent damp days, which always heretofore aggravated his symptoms. The tinnitus remains in lesser degree, and the hearing is improved about as much as one would expect from relief of the subjective disturbances. The hearing test follows:

Right		Left
	Whisper	
2′		16″
	Slight improvement after inflation	
	Schwabach (A) 40″ (about normal)	
	Weber (A) to right (better ear)	
	Rinne	
+ 12/35		+ 12/35
	(Air and bone conduction shortened)	
	Low Limit	
24 d.v.		24 d.v.
	High Limit	
Bone, a_6; Air, E_6		Bone, a_6; Air, f_6
	(Some loss by monochord, nearly normal by E_4)	
	Membrana Tympani	
Little opaque and retracted		Little opaque and retracted

Case 12.—Male, aged fifty-six years; locomotor ataxia, which has improved under intraspinal injections of salvarsan-

ized and mercurialized serum. Deafness; ringing noises, feeling of stoppage; postnasal discharge; sinusoidal deviation of the septum.

Right		Left
	Whisper	
4′		5′
After inflation, 10′	No improvement on inflation	
	Schwabach (A) 18″, 50%	
	Weber (A) to right (better ear)	
	Rinne	
+ 12/40		+ 12/40
	(Air and bone conduction shortened)	
	Low Limit	
24 d.v.		24 d.v.
	High Limit	
Normal		Normal
	Membrana Tympani	
Normal		Normal

After two months' biweekly massage with iodoglycerin, hearing right ear, sixteen feet before inflation; left ear, only slight improvement. Postnasal discharge only slight and occasional (there was no special treatment for this). Ringing diminished.

Case 13.—Male, aged thirty-nine years; uses much tobacco, chewing and smoking; deafness one year, especially for telephone; buzzing tinnitus. Chronic constipation.

Right		Left
	Whisper	
5′		6″
	No improvement on inflation	
	(A) Schwabach	20″ (About 50%)
	Rinne	
+ 12/40		+ 12/40
	Bone and air conduction shortened	
	Low Limit	
24 d.v.		36 d.v.
	High Limit	
Normal for c_4		Normal for c_4
	Eustachian Tube	
Open		Open
	Membrana Tympani	
Normal		Normal

Two months later, whisper, right ear, twelve feet; left ear, eighteen inches. Iodoglycerin massage was used, but I believe the improvement resulted largely from withdrawal of the tobacco and use of strychnin. About three weeks after last report above, sudden increase in deafness in right ear (whisper

reduced to two feet). I put the patient on sweats and potassium iodid, but have not yet retested him, nor have I solved the cause of the recent increase of deafness of right ear.

Since writing the foregoing, four weeks ago, this patient has returned. He took potassium iodid about a week, then of his own accord took cod liver oil. He has had no local treatment, but his hearing for the whisper in the right ear is now nine feet; left ear, one foot. He is again using tobacco freely.

Case 14.—Female, aged forty-six years; dressmaker. About a week before coming to me a ringing suddenly began in the left ear; cause unknown; family history negative; sore throat every winter; tonsils small, but with dilated crypts, two of which contain débris.

Right		Left
	Whisper	
8′		18″
After inflation, 22′		After inflation, 30″
	(A) Schwabach, normal	
	Rinne	
+ 16/50		+ 16/40
	Bone conduction about normal, air somewhat shortened	
	Low Limit	
24 d.v.		24 d.v.
	High Limit	
Normal for c_4		Normal for c_4
	Membrana Tympani	
Slightly atrophic		Slightly atrophic
	Eustachian Tube	
Normal		Normal; few rales

After a few weeks' treatment, hearing in right ear normal; left ear, three feet for whisper. The tinnitus showed no special improvement until I bougied the left tube, which caused considerable improvement, but it is not yet entirely well. One month after this test had an attack of vertigo, but with no increase of deafness or tinnitus. In this case and in Case 13, the tonsils were not healthy, and may have been the source of infection causing the trouble, as recently described by Dr. Shambaugh. However, I believe in Case 13 the trouble was largely due to tobacco, and that the attack while under treatment was due to a relapse of the habit plus some other toxemia, as there was no evidence of recrudescence of the throat inflammation. The rôle of intestinal and other toxemias in nerve deafness has not yet been solved. Both Cases 13 and 14 had chronic constipation.

It is likely that some of you have used massage of the tube by some other method. I have tried it by using the vibrator on the mandible and side of the throat, but not with such good results as by direct use of the applicator.

So far I have had no special results from this treatment in tinnitus that failed to yield to other treatment, but I feel encouraged a little in some cases. The treatment seems especially useful to remove the results of tubal inflammation in cases of not too long standing.

REFERENCE.

1. Zeitschrift für Ohrenheilkunde, Bd. 72, Heft 3; Bd. 73, Heft. 1.

LIII.

DOUBLE MASTOID OPERATION, WITH REPORT OF CASE AND EXHIBITION OF SKIAGRAPHS OF MASTOIDS.*

By Norman H. Goodenow, M. D.,

Everett, Wash.

This case report, with exhibition of skiagraphs and patient, on whom I did a double mastoid operation, a radical on right, simple on left, three weeks ago today, is of more than common interest, as it shows how closely the pathologic findings during the operation coincided with the readings of the skiagraph, and the value of X-ray in making a diagnosis and deciding as to the treatment to be carried out to bring about a cure in such cases.

The patient, a young man, twenty-one years of age, physically well developed, and in good health, consulted me March 19, 1916.

History. A chronic discharge of foul-smelling pus from right ear, following an attack of purulent otitis media six years ago. Subjective noises and earache at times. Two years ago was operated by a general surgeon, which did not result in a cure. Inspection of external canal showed it to be filled with thick, very foul-smelling pus; after forcibly washing out with a large syringe, drum membrane found to be thickened, and a linear perforation extending transversely across drum was seen. Eustachian tube inflated through catheter, after which the hearing was watch at six inches; whisper, two feet; fork, lateralized to this ear, and bone conduction over mastoid shortened.

Left Ear. Six weeks ago began to notice subjective noises and impaired hearing in left ear. Consulted a Portland physician, who washed out some cerumen. Since that date there has been a free discharge of pus from this ear, but without pain

*Presented before the Puget Sound Academy of Ophthalmology and Otolaryngology, Seattle, Washington, April 24, 1916.

and the usual symptoms accompanying an acute purulent otitis media. Inspection of this canal showed it to be filled with a thick pus, but without odor. This was syringed out, when a small polyp could be seen protruding through perforation in drum, which I removed with small forceps. Membrana tympani was thickened, moist and edematous. Inflation through catheter forced a mass of thick pus through perforation; this was removed, after which he heard watch at ten inches, whisper at three feet, bone conduction shortened.

Examination of nose showed both sides free and without signs of pus. Throat revealed very large infected tonsils, the removal of which I advised as the first procedure to carry out in view of curing the chronic ear suppuration. This was done the next day under local anesthesia. During the week following both ears were treated by forcibly syringing out with large syringe, drying out carefully, powdered boric acid dusted in canals and a small strip of gauze inserted to facilitate drainage. Under this treatment the discharge and odor from right ear greatly lessened; the left drum, however, remained moist and edematous. Through the perforation in right drum a white mass could be seen, which proved to be cholesteatoma.

On March 28th a skiagraph was taken by Dr. J. Howard Snively. His interpretation of the plates was as follows:

"On the right side there has been a chronic mastoiditis. At the site of the operation the bone is very thin, and cells have been destroyed; surrounding this area is an area of dense ivory-like-bone, due to the chronic irritation and suppuration. Most of the remaining cells have been nearly obliterated by this sclerotic process. On the left side the cellular structure is discernible over the usual area, but the cells are clouded as though filled with inflammatory exudate rather than air. The condition here is more or less acute undoubtedly, as no breaking down or necrosis of the cellular structure is seen."

On March 31st the hearing of right ear was watch at four inches, whisper at about two feet, both air conduction and bone conduction shortened. Left ear, watch at ten inches, whisper at three feet, air conduction and bone conduction shortened. I now advised a radical operation to be done on the right mastoid and possibly same on left. Operated on April 3rd, just three weeks ago today.

Operation. In doing the radical on right mastoid, I made a curved incision, the convexity of which I carried well back of ear. This gives a large wide flap of skin and underlying periosteum to be used in covering the field of exenteration in the bone when the wound is sutured and closed, thus leaving the line of suture over the outer table in place of over the cavity, which I think is quite an advantage in the healing process. After exposing the mastoid process I found a dehiscence of the outer table just anterior to the lateral sinus, this being the site of the previous operation, filling in with new bone never having taken place. This gap in the bone was filled with granulations and a probe was easily passed forward directly into antrum. After clearing away the granulations and removing the bone covering the antrum, the lateral sinus was exposed for about an inch. The membrane covering the sinus was healthy, and a pad of gauze was laid over it to protect it from injury while completing the operation.

I now removed the posterior bony wall of the external canal down to a level with its floor, then, with a small sharp chisel and curette, the facial bridge was cut through and removed.

The antrum was found to be full of granulations and pus, a mass of cholesteatoma was removed from the tympanum. The remnants of the ossicles and drum was also removed with curette and small forceps; the eustachian tube curetted thoroughly. The posterior superior wall was also removed, so that there was left no overhanging wall. I then made two parallel incisions through the posterior membranous canal, making a tongue flap which was pushed back in the cavity, a packing of iodoform gauze inserted through the external canal and the primary incision closed up its whole length.

An interval of fifteen minutes was now taken to prepare for the operation on left mastoid, instruments were washed and sterilized, gowns and gloves changed.

On the left mastoid my findings pathologically were in accord with Dr. Snively's readings of the skiagraph. There was no necrosed bone, but the antrum was filled with granulations and pus. I was able to pass a good sized probe through aditus into the middle ear, thus being assured of good drainage. I did not think it necessary to do a radical on that side.

The patient made a rapid recovery; did not have a post-

operative temperature; left the hospital the day of the first dressing, which was on the fourth day. The sutures were removed the next day and the wound of the radical found firmly united. The packing of the cavity of the left mastoid was discontinued and the wound closed at the end of two weeks.

There is now no pus in either ear, but there is some secretion in right ear from the granulating surface which has not yet epidermized over. I will lay in several Thiersch grafts tomorrow, which I think will hasten the epidermization, and I expect this ear to be dry in two or three weeks. The hearing in right ear, he says, is better than it has been for several years. It is watch at three feet, whisper at six feet; left ear, watch at six feet, whisper at ten feet.

LIV.

A MODIFIED RADICAL OPERATION FOR CHRONIC SUPPURATIVE OTITIS MEDIA.*

BASED ON EIGHT CASES. LANTERN SLIDE DEMONSTRATION OF PROCEDURE.

BY HUGH B. BLACKWELL, M. D.,

NEW YORK CITY.

In performing this particular operation on the following eight cases my purpose was (1) to stop the middle ear discharge and (2) to conserve or, if possible, to improve the hearing.

All of these operations were performed in the service of Dr. Robert Lewis at the New York Eye and Ear Infirmary, and Dr. A. B. Duel at the Manhattan Eye, Ear and Throat Hospital.

Operation.—The usual postaural incision is made, as in the Stacke operation. The soft parts anterior to this incision are elevated and retracted forward; the cortex is removed with a gouge and the subcortical cells with curettes until the antrum is opened. The posterior bony canal wall is lowered and the antrum widened to its fullest possible extent. When the short process of the incus becomes visible, the external attic wall is removed by placing the back of the curette external to and in front of the incus and curetting from within outward. The bony canal wall is still further lowered until the facial ridge is reached, leaving only an epitympanic ring in its superior portion, with a width of about one-sixteenth of an inch. In four instances I have removed this ring in the superior and outer quadrant of the circle, leaving the membrana tympani and ossicles intact.

*Read before the New York Academy of Medicine, Section on Otology, April 14, 1916.

The granulations, polypi, and cholesteatoma lying in the external and internal attic are removed by curetting internal or external to the incudal body, care being observed not to destroy the suspensory ligament of the malleus or its external lateral ligament. In curetting near the incus, great care must be taken not to disturb the ligament which binds the extremity of its short process to the bone below and just in front of the external semicircular canal. The drum and ossicle, of course, are not removed but are left in situ.

An L-shaped meatal flap is cut, as in a radical operation, the cartilage is removed, and the flap sutured to the temporal fascia. The mastoid wound and attic region are packed snugly, thereby furnishing support to the flap, and the posterior wound is sutured.

Case 1.—A subacute condition; history of seven weeks' discharge. Operation three years and four months ago; large perisinus abscess with perforation of the premastoid lamina and necrosis of the adjacent posterior bony wall. The ear has been dry ever since shortly after the operation. The incus was removed.

At present, the patient hears an acumeter at six feet and a moderate whisper at six feet.

Case 2.—Ear had been discharging for two years. Operation was performed two years and nine months ago. Cholesteatoma was found in the antrum. Ear has been continuously dry ever since shortly after the operation.

Whisper heard at eighteen inches, and watch only on contact, before the operation. The patient now hears an acumeter at one foot and a whisper at four feet.

Case 3.—Ear had been discharging for two years. Operation was performed two years and three months ago. The ear has been continuously dry since shortly after the operation.

Prior to the operation, the patient heard a whisper at twenty feet. She now hears a whisper at four feet and an acumeter at the same distance.

Case 4.—Double otitis media purulenta chronica. Right ear had been discharging for one and a half years, and the left for six months. Double operation performed two years and four months ago. Both ears are dry and have been so continuously since shortly after the operation.

Hearing before operation: Right ear, acumeter at three inches and whisper at three inches. Hearing now: Acumeter at two feet and whisper at eighteen feet. Left ear: Before operation, acumeter at twelve inches and whisper at one foot. Hearing now: Acumeter at six inches and whisper at twenty feet.

Case 5.—Double otitis media purulenta chronica. The right ear had been discharging for six months, and the left for two years. Double operation was performed simultaneously seventeen months ago. Both ears have been continuously dry ever since shortly afterward.

Hearing at present: Right ear, acumeter at twenty feet and whisper at twenty feet. Left ear, acumeter at fifteen feet and whisper at fifteen feet.

Case 6.—Double otitis media purulenta chronica. Both ears had been running for eighteen years, following scarlet fever and diphtheria. Operation was performed a year ago. The left ear has been continuously dry since shortly after the operation. The right ear has been dry at times, but is discharging at present.

Hearing prior to operation: Acumeter, right ear, three feet; left ear, six feet; whisper in both ears at six feet.

Patient now hears: Acumeter, right ear, eight feet; left ear, two feet; whisper in both ears at eight feet.

Case 7.—There had been a discharging ear for the past seventeen years. Operation was performed nine months ago. The ear has been dry at times, but is at present wet. The discharge is from the tube.

Hearing before operation: Left ear, acumeter at two feet, and whisper at six feet.

The hearing since the operation is the same.

Case 8.—Patient had discharge from the ear for five weeks prior to admission to hospital. Operation was performed six months ago, and showed necrosis of the posterior bony canal wall and perforation of the premastoid lamina. The ear is now dry and has been so for over four months.

Hearing before operation: Acumeter at twenty feet and whisper at twenty feet.

At present it is the same.

SUMMARY.

The eight cases presented represent eleven primary operations, for in three instances both ears were involved and a double operation was performed.

Nine of these operations have resulted in dry ears which have remained continuously so ever since shortly after the operation. In the remaining two cases the ears have been intermittently wet and dry.

The hearing was improved in five cases. In one case there was some decrease, and in two instances it remained the same. When questioned, none of these patients thought they had suffered any impairment in hearing since the operation.

In this connection, it is interesting to note that in Case 8 the hearing was almost normal before the operation. It is the same at present, showing that in this case at least the procedure had no ill effect upon the hearing.

An interesting feature is the development of a secondary tympanic membrane, which in all of these cases has grown across the attic region in the process of healing, completely closing off the attic from the mastoid cavity.

In performing the dressing it is necessary to pack the attic region snugly until it becomes well dermatized; otherwise it will soon become filled with a thick plug of granulations which, if infected, will be apt to discharge copiously, reinfect the middle ear, and prevent its proper aeration. It is probable that the discharge which occurred in two of the wet cases in this series was caused by the failure to properly appreciate the importance of this point.

It will be seen that the best results were obtained in those cases having a history of discharge lasting less than five years. The procedure seems especially applicable in this class of cases, and more particularly so in those chronic cases in which there is good hearing.

I believe that this operation is indicated in cases of aural discharge of several months' standing which have resisted treatment, and where the patient is threatened with the possibility of a long-continued suppuration. I do not think that the presence of a large perforation or the absence of half the tympanic membrane is a contraindication to the operation, as demonstrated by some of these cases.

The important element to be considered in cases of subacute and chronic otitis media, in the absence of constitutional symptoms, is, of course, the hearing. If this be good and the discharge under five months' duration, I believe this operation to be especially indicated.

In cases of exostosis of the canal associated with otitis media purulenta chronica, and in perforation of the premastoid lamina associated with necrosis of the posterior bony canal wall, it should be the operation of choice.

Another point in favor of this procedure is that the danger of causing an injury to the facial nerve is negligible.

In closing, I would say that this operation is not presented as one that would replace the radical procedure: that operation has its own distinct field of usefulness. It is very difficult to compare the results obtained from a radical operation with those obtained from a modified radical operation, save in a very general way, since of course no one could say what the results would have been in any one of these cases had a radical operation been performed.

I am convinced, however, that the functional results obtained in these case compare very favorably with the best which follow the radical operation, and that in the future, as we learn better how to select cases for this modified radical operation, it will yield even better functional results as well as a dry ear.

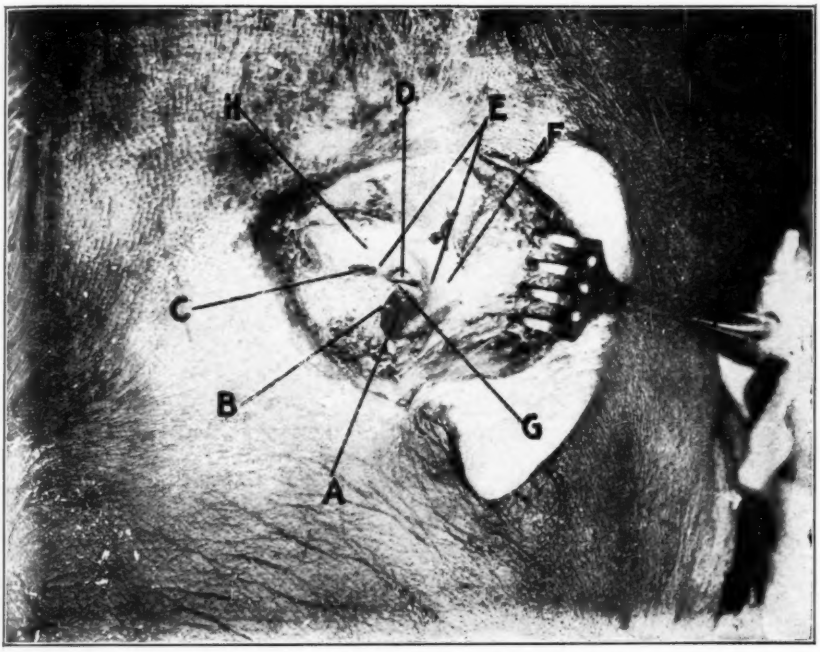

FIGURE I.—View of completed operation, with Epitympanic Ring intact, taken from behind, prior to closing posterior wound. Drum and Ossicles are left intact.
A—Membrana Tympani.
B—Facial Ridge.
C—External Semi-Circular Canal.
D—Malleo-Incudal Body.
E—Attic of the Middle Ear.
F—Plastic Meatal Flap sutured to Fascia of Temporal Muscle.
G—Epitympanic Ring.
H—Antrum.

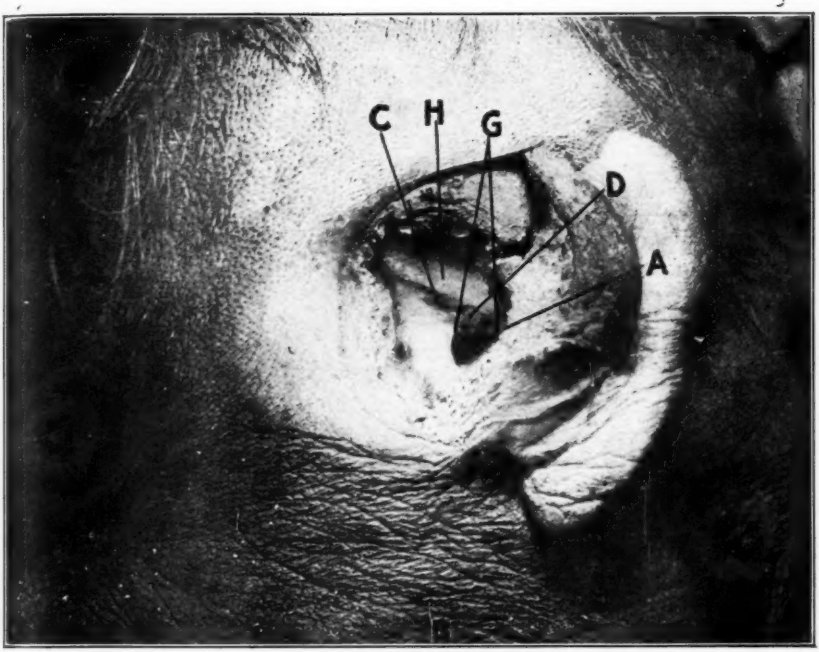

FIGURE II.—View of completed operation, where the Epitympanic Ring of bone has been removed in the superior quadrant. Drum and Ossicles are left intact

A—Membrana Tympani.
C—External Semi-Circular Canal.
D—Malleo-Incudal Body.
G—Epitympanic Ring of Bone has been removed between termination of lines.
H—Antrum.

LV.

NONDIABETIC ACIDOSIS—WITH SPECIAL REFERENCE TO POSTOPERATIVE ACIDOSIS IN CHILDREN.*

By Ira Frank, M. D.,

Chicago.

INTRODUCTION.

It is my purpose in the following paper to bring under one head and in concrete form a review of the literature, clinical and experimental, which is fast tending to outline distinctly the hazy concept we now call acidosis. I shall add thereto certain personal observations and attempt to produce from the whole a practical clinical entity, with definite etiology, definite diagnostic points, specific treatment, and direct and simple prophylaxis.

The subject should be of serious interest to those whose work is related to childhood, and especially to those of us who must frequently anesthetize children—for it is in the young that nonsymptom producing acetone is frequently found—it is in the young that the metabolic balance is most easily disturbed—and it is in the young that we tamper with several of the important etiologic factors of symptom producing acetonemia when we remove tonsils and adenoids under general anesthesia.

The literature on the subject is well nigh boundless, for a study of it leads to many branches and subbranches, each of which terminates in a maze of more or less conflicting theories supported by laboratory and clinical evidence. I consider, therefore, that a brief review of this literature, amalgamating the important points which have been brought out in the course of the last decade or so, and which will assist

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*Candidate's thesis, read before the American Laryngological, Rhinological and Otological Society, at White Sulphur Springs, West Virginia, May, 1916.

us in establishing that type of acidosis with which we are chiefly concerned—namely, the postoperative acidosis of tonsillectomies and adenoidectomies—as a definite entity, is in place.

How often the condition occurs in its milder forms few of us probably realize, for the manifestations of the majority of cases are usually overlooked. The well marked cases are less common, but the clinical picture once seen is not likely to be forgotten.

That acidosis does occur more frequently following tonsil and adenoid operations is perhaps due to the fact that children are more frequently anesthetized for this purpose than all other surgical reasons combined. Anesthesia is doubtless the most important causative factor involving, as it does, the starvation of the young patients previous to operation; the destruction of tissue due to the lipoid solvent properties of the usual anesthetics, ether and chloroform, and the modification of the carbonic acid content of blood during administration. In addition to anesthesia, another important element possibly accounts for this relatively frequent occurrence of acidosis in children, namely, that chronically infected tonsils and adenoids *per se* may have a more or less important bearing in the production of acid bodies.

DEFINITION.

Acidosis is a disorder of metabolism—principally of fat splitting, and perhaps to a much less extent protein splitting elements—occurring in the course of, or following, a large number of clinical conditions, characterized by the symptoms of varying degrees of intoxication by acid bodies, and the presence of these bodies or corresponding substances in the urine and blood.

ETIOLOGY.

The occurrence of acetone in the urine of nondiabetics without symptoms referable to this condition is very common, especially in children, and the number of disorders in which it is found is growing steadily in those clinics which require a test for acetone in routine urinalysis. Indeed, in apparently normal individuals under normal conditions twenty-four hour

specimens of urine have yielded acetone in amounts up to .02 gram (von Jaksch, Langstein and Mayer).

Bearing in mind then that normal human beings in the course of ordinary economy may show the presence of acetone in the urine, and remembering also that age is indirectly proportional to the ease with which the equilibrium of metabolism may be disturbed, it is logical, on purely clinical grounds, to assume that in a given number of children, certain individuals are more or less disposed to acidosis. In other words, we may consider an "acid diathesis" as an important predisposing factor. In a child with an acid diathesis we would expect to find an acetonuria following minor indiscretions in diet, during the course of mild infections (i. e., coryza); in chronic affections, as chronic tonsillitis, adenoids, chronic appendicitis; and in this type of patient we would expect to see acute acidosis, or the more severe form, acid intoxication, develop from exciting cause which in a normal individual would produce neither symptoms nor signs, at least, not more than acetonuria.

That acidosis is common in children with diseased and hypertrophied tonsils, adenoids, and catarrhal conditions of the upper air passages has long been known. Griffiths, E. Smith and others have noted the acute coryza which is frequently a premonitory symptom of the acute recurrent or cyclic attack. These authors have noted marked improvements, and cures following treatment of the pharynx and nasopharynx. Sedgwick reports a series of twenty-two cases of recurrent vomiting, twenty of which had adenoids or enlarged tonsils, and in most of them there were symptoms of infection preceding or during the attacks. In seven of his cases symptoms of appendicitis were present, two of which were operated with absolute cessation of symptoms. Comby found appendicitis in approximately fifty per cent of his cases.

From my own experience, I can affirm a possible correlation between the chronically inflamed tonsil and acetonuria. We have, as a clinical experiment, operated on a large number of children under conditions almost ideally prophylactic against acidosis, and whose anesthetic has been nitrous oxid for a period not exceeding two minutes. Two-thirds of these cases showed an acetonuria in the first twenty-four hours post-

operative, although tests were negative in all the cases before operation. In other words, active prophylaxis, including a remarkably short ether free anesthetic, does not prevent a mild acetonuria in the majority of cases.

Nondiabetic acetonuria and acidosis occurs in chronic inflammations, acute specific infections, gastrointestinal and systemic disturbances. Variation in normal diet, as starvation, deprivation of carbohydrates, maldigestion, or the ingestion of fats in large quantities produce the phenomena. It is often noted in cases of poisoning and in toxemias such as occur in pregnancy and advanced malignant disease. It occurs very often in the course of cardiac and renal affections.

Anesthesia, however, is the most common etiologic factor. Children under twelve years never fail to show acetone in the urine in the twenty-four hours following a general anesthetic. It is to this type I wish to call your attention, as I believe that a study of it will assist in the prevention, recognition and treatment of the symptom producing forms of acetonuria which we term acidosis.

PATHOGENESIS AND PHYSIOLOGY.

The economy of the animal body requires for its life and activity the consumption of fuel. Whether this fuel is supplied by ingested food or by the tissues of the organism, its combustion is essential to the phenomenon of life itself. The source of energy for all physiologic functions is known to be the chemical breaking down of alkalis and bases.

Fats, carbohydrates and proteids produce energy then by a complicated catabolism which results in end products of both acid and basic structure. The alkali radical is life sustaining—the acid principles are life destroying. Metabolism, therefore, necessitates the use of alkalies and the rapid elimination of acid end products—for life is incompatible with acidity.

The acids to be eliminated are in gaseous form or in solution. The gaseous acid (CO_2) is given out by the respiratory act. The acids in solution are thrown off by way of the kidneys and sweat glands—and under normal conditions in such form as to cause no injury to the organism.

When, however, this metabolism is deranged the food ele-

ments are improperly or incompletely broken down, and abnormal acid end products result. It is certain of these products, acetone, diacetic acid, and betaoxybutyric acid, with which we are concerned.

In the list of conditions during or following which acidosis occurs, it is evident that in a majority of them a toxic influence precedes the actual formation of acid bodies. For instance, in the specific infections and in inflammations, bacterial toxins and toxic absorption are present before acetonuria is observed. That this is no uncommon forerunner of acidosis is shown by Reiche's report of 3,826 cases of diphtheria and acute anginas, of which 3,200 were acute diphtheria, with varying degrees of acetonuria in sixty per cent. Similarly, a factor of "primary" intoxication is discernible in the acidosis ocurring in Bright's disease, the cachexia of malignancy and the toxemias during pregnancy. In the type of acid intoxication described by Parke and Abt during the weaning period, the primary toxic element may be accounted for either in the artificial feeding or by some quantitative or qualitative change in the mother's milk as the period of lactation nears its close. In the cases of poisoning from phosphorus, salicylates, etc., we have, as toxins, not only these substances per se, but also the toxins produced by the effect of the substances on the tissues.

The use of general anesthetics introduces toxic substances into the blood which vary greatly in their effect on the various organs and tissues. Chloroform may produce serious, extensive, even fatal lesions in the liver, and this, too, following relatively short anesthesias. Ether may affect the liver—but its principal point of attack is the kidney. In anesthesia, therefore, we have also a primary toxemia to account for the frequent occurrence of acidosis. Waldvogel has concluded that a direct toxic action of the anesthetic is responsible for the acidosis in children under his observation, and similar conclusions may be drawn from the recorded series of Rice, Frew, Chalfont, and others.

The mechanism by which acidosis is produced from a primary or preexisting toxic element is shrouded in mystery, but the balance of evidence is in favor of an hepatic disturbance (Embden) resulting in abnormal processes of metabolism, the

end products being the acid bodies. McClean expresses this disturbance as the result of the cumulative action of absorbed toxins in the liver, with consequent failure of the organ to properly perform its functions. There follows disarrangement of the carbohydrate metabolism, and the resulting interference with the glycogen storing or glycolytic power of the liver reduces the proper supply of energy producing sugar, thus inducing a disturbance of fat and protein metabolism. As Nasse puts it, the lack of carbohydrate necessary to activate oxygen in the body thereby restricts the oxidation of fats and proteins to their normal end products.

We must assume the acetone compounds to be responsible for the clinical condition we know as acidosis. Betaoxybutyric acid, diacetic acid, and acetone are found so consistently in the blood and urine of these patients, and are so constantly in proportion to the number and degree of the symptoms displayed, that we have for the present no alternative but to believe that the condition is an intoxication or saturation of the tissues and body fluids by these acid bodies.

It has been shown that the three substances, which are structurally closely related, may be produced in the test tube from sugars, proteins, or fats, but clinical observation and metabolic experiments seem to show that the acid bodies are produced from body fat or food fat almost entirely—and possibly, to a very small degree from proteins. The rôle of carbohydrates is still uncertain, but it is understood that sugars are necessary to the economy, either to spare the body fats or to facilitate the destruction of food fats past the acetone stage, because sugar starvation results in acidemia.

The acid bodies in acidemia do not, so far as we can now determine, change to any marked degree the actual alkalinity of the blood, and they are practically nontoxic when administered to healthy subjects in large doses. They do, however, by their slight acid action withdraw alkali from the tissues, and when present for a greater or less time produce nephritis.

PATHOLOGY.

Those cases of nondiabetic acidosis which have come to autopsy show little that can be termed characteristic. Frequently fatty degeneration of the liver is noted, occasionally

nephritis. Recent observers (Lucibelli, Crile and others) have found histologic changes in the central nervous system, amounting to a peculiar swelling and liquefaction of nervous tissue.

The constant finding is the marked increase in the blood of acetone compounds, which are present normally in very small amounts. It has been shown, too, that the CO_2 tension of the blood is indirectly proportional to the degree of acidemia.

Though the urine is said to show frequently a rise in ammonia content preceding acidosis, the first practical clinical finding is the presence of acetone as determined by the Lange (Legal or LeNobel) test, or the iodoform test. Acetone is the first of the acid bodies to appear in threatened acidosis, and is followed by diacetic acid, and finally betaoxybutyric acid. As the condition subsides, the substances disappear from the urine in the reverse order. In postoperative acidosis this characteristic aids in the diagnosis of the degree of intoxication and assists in forming a prognosis. With experience it is possible frequently to determine the turning point of an attack in the test tube even with these qualitative tests, before it is clinically evident.

SYMPTOMS.

The first clue to an impending acidosis following an anesthetic is practically always to be found in the pulse record in the first hours succeeding the return of the patient from the operating room. Depending on the duration and depth of the anesthesia, and on the amount of blood lost during the operation, we expect in a greater or less number of hours either a return to normal of the pulse rate, or definite signs that such return is in progress. When in the early postoperative period the pulse rate increases, remains stationary, or lowers only slightly from the rate during anesthesia—and this, too, in the absence of signs of shock, collapse and hemorrhage—an examination of the urine reveals the presence of acetone in marked quantity.

Routine postoperative urinalysis has demonstrated the presence of acetone in a high percentage of all cases, and in children the finding is practically constant. In the majority

of cases no symptoms referable to this condition are apparent, and the last trace of acetone disappears under suitable diet in one to three days. In those cases, however, where the pulse rate is high following operation, we have the first intimation confirmed by urinalysis that the patient is reacting to the presence of acid bodies.

I have found that in the great majority of cases this is the only symptom displayed and is followed in one or two days by a return to normal and a gradual diminution in the acetone excreted.

In a second group of cases a persistent high pulse rate is complicated in four to eighteen hours by the appearance of languor and drowsiness, in some instances approaching stupor, and a marked tendency to restless sleep. These patients show an increased respiratory rate, varying indirectly, according to the age of the patient, and directly to the degree of the reaction, from twenty-eight to forty-eight per minute. The respiration is regular, rather superficial, and the odor of acetone—sweet, "fruity"—is noted in the exhalation. The facies is either pale or (if the temperature is high) flushed, with usually a tinge of cyanosis. Dark circles appear under the eyes. The tongue is usually heavily coated.

The stuporous condition may vary from a mild degree to a truly alarming display. It is distinguished from the holdover effects of anesthesia by the fact that the patient has already come out of the anesthetic—in other words, has had an awake period before the onset of this secondary drowsiness. The patient is restless and exhibits more than ordinary postoperative thirst, and if sleep occurs it is only for short periods. Thirst is the principal complaint—even the youngest children are quiet, arousing themselves only to ask for water.

The examination of the urine from these patients reveals a heavy acetone reaction, and a definite trace or positive diacetic acid test. Under treatment, and coincident with the disappearance of the drowsiness or stupor, the diacetic acid disappears, and, more slowly, the acetone reaction lessens in degree, the test becoming negative in four to six days.

In a third group of cases, which is decidedly small (occurring in my practice is about two per cent of operated children), a more severe degree of acidosis occurs. In this type the rapid

pulse and stupor is soon followed by frequent retching and vomiting—nothing is retained by the stomach. On entering the room we are immediately impressed with the fact that the patient looks sick. Prostration is marked, stupor is a prominent feature, and the cheeks are flushed, frequently cyanotic. The periorbital tissues become rapidly sunken, and the acetone odor of the breath can be detected some distance from the patient. Nervous phenomena may be present, varying from the usual restlessness to delirium or convulsions—even coma.

Analysis of the urine in this group of cases shows the intense acetone reaction, and the test of diacetic acid is markedly positive. Under treatment we find an early disappearance of the diacetic acid, the test becoming negative in twenty-four to seventy-two hours; coincident with and following this, a gradually diminishing acetone reaction. As these substances leave the urine the patient returns to health by reversing the order of the stages we have enumerated. Vomiting is the first symptom alleviated, followed closely by a disappearance of stupor and drowsiness, and finally there is a return to normal respiration and pulse rate.

Levison has classified the degrees of postoperative acidosis as

1. Subacidosis—acid products without symptoms.

2. Acidosis—definite symptoms, vomiting and marked restlessness.

3. Acid intoxication, with a clinical picture marked vividly by delirium, coma and convulsions, preceded by a stage of restlessness and vomiting.

According to the cases I have seen, it seems more practical to me to consider Levison's first type as a purely physiologic reaction of the tissues to ether, and my three groups of cases, as subacidosis, acidosis, and acid intoxication, respectively.

Chalfont, in a study of seven hundred anesthetics, lays emphasis on the fact that postoperative vomiting is related to acetonuria—i. e., the liability to vomiting is increased when acetone is present. This is no doubt true, but in most cases we are able to distinguish the vomiting of anesthesia from that of acidemia, inasmuch as the latter appears, as a rule, several hours after the anesthetic vomiting has ceased.

TREATMENT.

From the early opinions regarding the nature of acidosis it is readily seen how alkali therapy came into repute, and it is only in recent years that reports regarding the efficacy of alkali therapy, especially in the acidosis of diabetes, were more replete with failures than successes. In the nondiabetic acidosis the successes reported may be due to (1) a moderate alkalinizing effect from such therapy, or (2) the fact that the attack itself was subsiding when the treatment was instituted.

The treatment of postoperative acidosis as now practiced is eminently successful and satisfactory, and consists of (1) the combating of the abnormal physiologic processes which we know are producing the symptoms, and (2) symptomatic control. Prompt reaction to such treatment is the rule, twelve hours being freqeuntly sufficient to change an appalling clinical picture to practically normal health.

To oppose the process we must, according to the laboratory confirmations of our present theory of acid intoxication, supply either the carbohydrate which is lacking in the metabolic mechanism, or some easily absorbable substance which will produce energy sufficient to insure the proper oxidation of the fats or spare the body fats.

Glucose has been most widely used, given by mouth in varying quantities in the mild cases, where the stomach is retentive. In those cases in which the stomach is irritable, rectal feeding of a five to eight per cent glucose solution in normal saline by the Murphy drop method—or, more preferable, interval feedings of four to eight ounces of the solution—results are prompt and gratifying. Subcutaneous injection of sugar solutions have been made with varying results. Levison reports that in his experience subcutaneously introduced sugar is eliminated, without change, in the urine. The intravenous injection of sugar causes a prompt and marked change in the clinical picture, though the procedure is followed by a chill and sudden rise in temperature. None of my cases has been sufficiently severe to warrant this method, but it has been extremely successful in certain cases reported to me by several of my surgical colleagues.

Though glucose alone in the above methods of administra-

tion has proven successful from all aspects, it is my practice to supplement the treatment with solutions of sodium bicarbonate, either by mouth or per rectum, with the sugar. This is done not only to gain the benefits it may have in alkalinizing the acid bodies, but also because of a noticeable good effect on the nausea and tendency to vomit.

Glucose is given as the carbohydrate of choice, because it is presumably rapidly absorbed as such. Allen has recently suggested the rectal feeding of dilute solutions of alcohol in diabetic acidosis, which has been tried with success, but I do not believe the prompt action and relatively unirritating character of glucose solutions require us to make any change in our present methods.

As to symptomatic treatment little need be said, for under proper care the more severe symptoms are soon alleviated. When vomiting is very frequent and distressing, simple lavage with plain water, saline, or sodium bicarbonate solution brings relief for four to six hours, and it is rarely necessary to perform this more than twice.

When dehydration has been severe, it may be advisable to give saline infusion. It is certainly of advantage to push fluids at all stages of the attack.

As soon as the stomach permits, a diet consisting largely of soft carbohydrates—cereal gruels, corn starch preparations—is given, and as symptoms and laboratory findings subside, the diet is gradually brought to normal.

PROPHYLAXIS.

Our discussion of both the clinical and experimental sides of acidosis has revealed a number of points which, when brought together, constitute a definite symptom of prophylaxis.

We have seen that certain children are apparently predisposed to acidemia or acidosis—or, as Silberstein expresses it, "an idiosyncrasy with intolerance" probably exists. In these cases it is frequently found that traces of acetone are present constantly, or with slight constitutional disturbances. In general, then, it is possible to minimize the dangers of a tonsil and adenoid operation in these children by routine examination for acetone in the urine, and to reduce the possibility of acidosis in all cases by the reduction of fat, and increase of carbo-

hydrate intake on the day preceding the operation, by the introduction of glucose, either as candy or in lemonade, at this time, and by avoiding the unnecessarily long starvation period in preparation for the anesthetic.

The choice of anesthetic has probably little effect. I have, as previously stated, performed a number of tonsillectomies under nitrous oxid, and have found acetone in the postoperative urine, without, however, any symptoms of acidosis.

Levison states that the drop method of giving ether has reduced the number of cases by about one-half, and in Crile's method of anociassociation with the very minimum use of ether, acidosis is practically negligible.

After the operation the granting of water in rapidly increasing quantities serves to dilute toxic substances, stimulate urination and the elimination of toxic bodies; and the early administration of some form of carbohydrate greatly reduces the number of symptom producing acetonurias.

In concluding, I wish to repeat briefly and emphasize certain points brought out in this discussion which are of practical value to us in that they lead to an early recognition and a promptly successful treatment of a complication of tonsillectomy which would otherwise be a severe strain and cause of anxiety to the surgeon and all others concerned.

First.—Acetone is found in the postoperative urine of practically all children. This acetonuria produces no symptoms in a great majority of cases.

Second.—Varying degrees of acidosis or symptom-producing acetonemia follow anesthesia in about twenty per cent of cases in children, in individuals predisposed by chronic infections, age, etc.

Third.—The symptoms of acidosis are such that three degrees of severity are readily apparent. These are:

(a) Subacidosis. Acetonuria and rapid pulse.

(b) Acidosis. Acetonuria, diacetic acid in the urine in small amounts, rapid pulse, drowsiness, languor, rapid, shallow respiration.

(c) Acid intoxication. Acetone, diacetic acid is markedly present, rapid pulse, drowsiness, nausea and frequent vomiting; heavy acetone breath.

Fourth.—Acidosis may be prevented, or its degree lessened, by a carbohydrate diet preceding the operation; by shortening as much as possible the starvation preparation; by the use of nitrous oxid, or a short ether anesthesia, and by the use of further carbohydrate diet as soon as the patient is in proper condition following operation.

Fifth.—Postoperative acidosis in any stage readily responds to solutions of glucose, administered by mouth or per rectum, or in very severe cases intravenously, with sodium bicarbonate as a possibly valuable adjunct.

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LVI.

THE SOCIAL AND ECONOMIC ASPECTS OF DEAFNESS.

By A. J. Amateau.

New York.

The title of the subject assigned to me for treatment is so sweepingly general, that I should not do justice to the matter at hand without a word of explanation. As I understand, I was requested to deal with the social and economic problems of the deafmute as evidenced in my experience as the manager of the Society for the Welfare of the Jewish Deaf. This paper will, therefore, confine itself strictly to our experience and will deal only with the Jewish deafmutes of New York. Of course, deductions and conclusions can be made as to the economic and social aspects of a similar group of deafmutes, here or in any other city, under the same or similar circumstances.

There are over ten thousand deaf and deafmutes in New York City, twenty-five hundred or more of whom are Jews. This society was organized in 1910-11 to furnish industrial education and secure work for the unemployed Jewish deafmutes of New York; to promote their social and intellectual welfare, and to provide them with religious instruction and opportunities for public worship.

You will notice from the objects that I just read that "industrial education and securing work" were placed first on the list of activities as a means of bettering the condition of the deaf, so that instead of beginning to treat our subject from the social point of view, I shall begin with the economic; for the economic situation of a man, whether handicapped or otherwise, has a great deal to do with his social life. The work was, therefore,* started with the establishment of an employment bureau. This employment bureau, by the way, is the only or-

*Read before the New York Academy of Medicine, Section on Otology, May 12, 1916.

ganized employment bureau for deaf in the world, and the only place where a systematic study of the deaf from an industrial standpoint can be made, and we have used it as our laboratory.

What is learned there is used in other fields, all in the attempt to make the deaf efficient economic units and to coordinate their life with the larger life of the normal. Through it not only have we placed deafmutes in positions and made them self-supporting, but we have also ascertained to a certain degree what other activities had to be instituted in order to ameliorate the situation of the deafmute. Through it we ascertained their social and intellectual status, and we found that the methods of education employed at the school which they attended, the kind of training they received, their religious training or lack of religious training, as the case may have been, had a great deal to with their social and economic well being. In this way not only did we obtain information as to what was lacking, but we also learned how to proceed and how to measure the effects of those activities that we had already begun.

Through it was found the necessity of creating evening classes for immigrant deaf who, because of their ignorance of even rudimentary English, were unable to either secure jobs or to hold on to those obtained for them. The results have been very satisfactory.

Through the Bureau, it became evident that evening classes should be formed to round out the unfinished education of those of the deaf who had left before the completion of their school course. Over 66 2/3 per cent, or to be exact, one hundred and eighty-five out of two hundred and seventy-five of the cases handled by the Bureau in the first two years were of this class. They are among those who possess an inability to keep their positions. They are what we called our "recurrent cases." They require an expense of energy far out of proportion to their number, and after the energy is expended, there is no assurance that the work done will not have to be done all over again. Part of the reason for their "chronic job losing" is their incomplete education. We do not blame the deaf man, but we do blame his lack of education. Two got eight jobs; one, seven; three, six; eight, four; forty-seven,

two, and one hundred and thirty-seven, one. And to avoid this duplication, triplication and even further multiplication of our work, the Bureau has led us to inaugurate plans for evening classes to eradicate some causes for such a chronic job-losing disposition.

It was found through the Bureau that many had lost their jobs because of unhealthy moral and social surroundings. After work they used to congregate about street corners or in dingy rooms back of saloons or in houses where games of chance were indulged in, not to mention other things. One instance of this can be cited:

J. K. was a jewelry polisher making from fifteen to twenty dollars a week. He found that he could earn more by gambling. He quit his job. Later he persuaded another deaf-mute to do the same, but unfortunately C. L. was not a proficient gambler. He applied for work at the Bureau. His case was investigated. His former employer, a crude, uncultured but big-hearted man, was indignant at C. L.'s leaving, protesting that C. L. had no reason to leave because of working conditions in his tailoring and pressing shop. (He had the corner cop, the street cleaner, the gas inspector and the next door barber confirm his statement.) He told us that J. K. had probably something to do with his leaving. This we later found out to be true, and also that some other deaf were being affected.

We felt that the real reason for gambling of some of the deaf, their frequenting of street corners, etc., was not perverted impulses, but rather a misdirected expression of gregarious instincts. To redirect aright these fundamental instincts, social clubs were formed in Harlem, the Bronx, the lower East Side, Brooklyn and Brownsville. These clubs have instilled in their members a social consciousness which has created a respect for themselves as a class, besides the lesser advantages of team work and orderly parliamentary proceedings. The economic efficiency of many has been thus increased. In a few cases we have firmly and politely informed a chronic job-leaving deafmute, whose activities had been detrimental to his economic efficiency, his good name and that of the deaf, that if he did not mend his ways, we would see to it that he is rejected as a candidate for admission to a

social club (if he is not yet a member) or that he be expelled if he is already a member. This threat works because the normal members of his family or his neighbors, being unable to communicate and sympathize with him or to appreciate him, the deafmute must seek the social intercourse of his fellow-handicapped, if he is to enjoy life.

COORDINATING SOCIAL AND RELIGIOUS TO ECONOMIC.

The president of the Hebrew Congregation of the Deaf, the religious department of our work, the presidents of the various social clubs, are informed of undesirable situations, and these in combination with pulpit utterances and editorial comment through *The Jewish Deaf* (our monthly publication in their interest) combine to act as an incessant and powerful reminder to the deaf that they are judged as a class; that the individual transgression is laid at the doors of the collective mass; that consequently extraordinary care must be paid by the individual and extra strong pressure exerted by the group, and that if this is not realized in conjunction with the fact that the economic status of the deaf determines their place in society, they will fall back. Satisfactory proofs of the success of these lines of attack are becoming progressively evident. We have of late been astonished to receive calls from employers who have said: "I have a deaf boy here working for me. He saw I needed more help and asked me to phone you up. If you have any more like him, send them along." To any one who knows the jealousy and suspiciousness based on sensitiveness that unfortunately characterize the deaf as a body, this is remarkable.

The employer, speaking generally, does not want to employ deafmutes. He thinks they are no good. You will note the word "thinks." This attitude is fundamentally rooted in among his stock of prejudices, which he struggles bitterly to preserve whole and not to alter, often in the face of uncontrovertible facts. "It may be so, you see, in the case of such and such a line, but it won't in mine."

This prejudice as to the economic efficiency of the deaf can be traced back to the time when there was ample justification for it—when the deaf were illiterate, ignorant of a trade, incapable of doing aught but begging—a load on society, some

one that had to be borne with for sweet charity's sake. But things are otherwise now. As a class the deaf have become economically self-supporting. There should be no reason for refusing to give a deaf man a chance at a job, all things else being equal.

This combating of prejudice against the deaf constitutes the main work of the Bureau. The task divides itself here into two main divisions—the worker and the employer. We can and do exercise a great influence over the worker, as partly outlined above, by a coordination of the social, the educational, the religious with the economic. On the employer we attempt different methods which will be treated further on.

There is one particular problem of interest we were confronted with and which we successfully solved. It is the problem of the "riff-raff," those who don't want to work, those who are parasites, lazy, indolent—the hobo class of the deaf. The measure of the harm they have done to the good name of the deaf is incalculable. Many and many an employer whom we had, after strenuous and exhausting efforts, induced to take a deaf man, has informed us that he absolutely would not take another deaf employe. He had had enough. His unfortunate experience with one had made him deaf to our further pleas for fair consideration of the rest.

That such results should have been caused by the actions of some of the irresponsible deaf is deeply regrettable, and their conduct merits utmost and unsparing condemnation. After all, they constitute only two score or so (about two per cent of all the deaf). Yet in 1914, fifty-seven (forty-seven per cent) of the applicants were given one hundred and forty-three jobs (sixty per cent of the jobs), and in 1915, thirty-eight (thirty-six per cent) of the applicants were given seventy-eight jobs (fifty-five per cent). The smaller percentages evidence the beginning of a new policy inaugurated towards the latter half of 1915, part of whose results are indicated in the smaller percentages. It was found that on the average, seventy-five per cent of the employers of such deaf refused to hire any other deaf. This loss is greater than indicated numerically, by the fact that every employer satisfied means not only one more whose prejudices have been overcome and who will employ other deaf, but also one who, if pleased, will communicate his

pleasure to fellow employers, who cannot but be impressed by his direct testimony. In view of such a pressing situation, we decided to withdraw all such trouble-makers from the employment market and to place them to work under our direct supervision, a poster-mounting shop being organized for this purpose. Perhaps the results can best be illustrated by citing a few examples.

There is H. L. He was given and lost eight jobs within three months. His record reads: Discharged for laziness; discharged—inefficient; discharged — fighting; discharged—violated smoking regulations. He is a mental defective. His parents are such in name only. His home surroundings are highly demoralizing. For a time he was in a reformatory. We thought him hopeless, but he was given a job in the shop. He is now one of the most efficient workers of the shop. This was done by a policy of strict and rigid kindness. He had an amusing habit of shaking hands with every one he met, stopping all work to do so. Within a month every policeman, ticket chopper and seller on the route of his errands knew him as the "dummy" who always shook hands. He was told to "cut it out and tend to business." At first he demurred, but a frown of reprobation and a warning finger raised as if to a child subdued him. So zealous a worker is he now that it has been found necessary to prevent him from carrying packages too heavy for him. Last week, when his salary was raised from five to seven dollars, he was so overjoyed at the thought that after all he was of some use on earth, that he ran about the shop in hilarious glee, waving his money about. In his case proper treatment had made a workingman of a formerly useless aggregate of flesh and bone.

Another case is M. L., a young lad of good family and breeding, intelligent, but very hard to suit in jobs. Of eight given him, he left six. He was given a job in the shop. Things didn't suit him. He left. Later he was given another chance, though he was told that if he left again he would not receive any help through the Bureau. This kept him there for a few months until his "wanderlust" broke out again. After a few months he asked to be taken back. This was refused. He appealed to his social club and brought us a letter from the president to the effect that he had settled down, and recom-

mending reconsideration. He was then taken back. He is now a better worker than ever, having earned an increase from seven to ten dollars.

H. S. was given eleven jobs. He seemed to be a fine chap, but it was soon found that he needed a bracing up. He was rankly lazy. To settle his case he was discharged and told to get a job for himself. Perhaps then he would learn to hold on to it. He did. Now he is engaged to be married—an evidence of success.

I. M. was a useless mess, without exaggeration. He refused to believe we were serious when we promised not to give him a job for a year if he left. He left and did no work for a year. He found he couldn't get any himself because of his unprepossessing appearance and general ignorance added to his deafness. After he had learned his lesson he was given a job in another factory, with the warning that if he lost it, we would have nothing to do with him henceforth. This seems to work, and he has, mirabile dictu, kept his job three months already.

Our only excuse for the above methods is that they work. Most of those who had positions in the shop are not there now. They thought that because the shop was under the auspices of an organization concerned in their welfare they could do as they please. Their interpretation as to what constituted their best welfare did not coincide with ours. They left, though warned of the penalties of their attitude,. which warning they refused to believe was given in seriousness. They were quickly disillusioned and found themselves thrown on their own resources. This necessity, combined with the force of social approval manipulated through the pulpit, the press and the clubs, have made them obtain their own jobs which they are keeping. Many are making out very well. Last year they composed about eighty per cent of our unemployed list. This year they compose zero per cent.

The difficulties in obtaining work have been largely due to conditions outlined already—incomplete education of some of the deaf, chronic job leavers or the "hoboes," the employers' prejudice against employing any handicapped. To these might be added that the employer rarely thinks of calling up an employment bureau for the deaf. Most often when he does,

we are unable to satisfy his requirements, because of the limited number of applicants. The demand for labor is in inverse ratio to the number of applications for assistance. The Bureau is constrained to seek positions in those fields the deaf applicants are experienced in or in which they can possibly engage.

In other words, the work of getting jobs for the deaf is purely that of going out and hunting for them, getting past officious stenographers and office boys and obtaining an interview with employers, trying to overcome unexpressed aversion (they rarely express the truth in such cases), showing them that some of the biggest business houses of the city, like the department stores, mail order houses, cloak and suit companies, shops, factories, etc., employ deaf men to everyone's satisfaction, that two hundred different firms have employed deafmutes through our Buerau. "It's all very well," says he, "but how can we talk to them?" Here the value of the method of education, articulation and lip reading come into play. We tell him of the wonderful methods of oral instruction, and arouse his curiosity in this respect.

In some few cases the employer is so astounded by the fact that a deaf man really can work and speak, that he expresses a willingness to see for himself. This is of course curiosity overcoming prejudice. Others advance objections on the ground of efficiency. We argue that the deaf are not distracted by any noises or the usual temptations that distract the normal worker, thus making him more efficient. "There is ample testimony to prove this," we say. Each line of argument must of course follow the peculiarities of the individual employer. Many show a willingness to listen, but that is as far as it goes. Unfortunately, it is not within our power to ascertain to what extent the employers' excuses or reasons for refusal to employ the deaf are true. It is difficult to separate the chaff from the grain in these assigned reasons.

Another difficulty we meet with is the restriction caused by the fact that the schools teach few trades. Printing, carpentry, millinery, hand sewing and sign painting constitute the main divisions of any industrial value. If we ever restricted our endeavors in these fields, it would result in overcrowding. As it is, such is the situation in lines like printing and car-

pentry. Our reports show over seventy-five different trades the deaf work in, such as:

TRADES AND SALARIES.

Architectural draughtsmen	20
Bird cage makers	6
Bookbinders	9
Bookkeepers' assistants	8
Bottle washers	10
Operators, finishers, pressers on ladies' and men's garments	7-20
Cigar box makers	14
Chandelier workers	12
Rhinestone setters	25
Errand boys	6
Compositors	13
Jewelry polishers	11
Engravers	15
Die makers	15
Hat framers and rounders	7
Shipping clerks	8
Vulcanizers	18
Wire winders	9
Sales agents	7
Upholsterers	25
Slaughterers	22
Feather workers	7
Porters	7
Leather goods workers	8
Sign painters	12
Linotypers	24
Table gluers	8

It will be noticed that these trades require the minimum of intercourse with either fellow workers or foremen. The work is routine, and once set forth no further instructions are needed. Some of the semi-professions, like bookkeeping and architectural draughtsmen, are very rarely acquired by the deaf, and it has in general proven difficult for us, using every source of influence, to obtain work for the applicant. Such

lines, though routine, require some intercourse. The deaf, though they can learn these trades and work at them, find it hard to obtain such positions and to keep them. It is inadvisable to train the deaf in any but those trades requiring repetition of movements or where there is no necessity for repeated instructions.

The salaries paid the respective trades are pretty close to the average paid the hearing, though the maximum limit is far from being the same. The department of any trade commanding the high salaries requires a degree of skill which the employer refuses to permit the deaf worker to acquire. The kinds of work the deaf seem to hold on to best, varies directly with the simplicity and extent of the mechanical and routine features of the work.

Work requiring very close contact with other workers is bad for the deaf, because of the constant friction that arises, often making the deaf man blaze forth in anger. The worker likes to tease. The deaf man is sensitive. The union worker thinks the deaf man gets his job because he has agreed to work under pay, and dislikes him for that. The unions demand that the deaf join them, but after this is done they cry out that the deaf are incapable of living up to their standards. This is unjust and untrue. Sufficient data has been accumulated to disprove their contentions. The deaf do not like to work with other deaf. Often their working together handicaps their efficiency, because they cannot resist the temptation to converse. They cannot work and talk; ergo, they talk.

Some modern tendencies seem to be working to reduce the deaf to a lower level, despite the heroic efforts made by the deaf to prevent this. "Safety First" movements, compensation laws, minimum wage acts, tend at first to act against the deaf. As it is, the employer has no strong inclination, if any, to hiring any deaf person. Add to this unwillingness, the fear (unfounded, it is true) that the deaf are more liable to accidents than the normal, which, if true, acts against the employers' financial interests, and you have there a situation which calls for concern. The minimum wage law will have serious effects on the deaf. These laws are of great benefit to the laboring class, and it is hardly fitting that any opposition to these laws should be aroused because of its harm to the deaf.

It is a matter of pride that the deaf do not work against the enactment of these laws. They believe confidently that they will after a time ultimately vindicate their efficiency. This remains to be seen.

The problem here is essentially a school problem—the fitting of the deaf to meet these new and more stringent industrial requirements. This is the great problem now before the deaf. On it depends their whole economic future, and since the economic is the foundation of an individual's life, on it therefore depends the entire happiness of the deaf.

Trade education of the deaf as it is now taught is not altogether satisfactory. When first inaugurated it was sufficient to meet industrial requirements, but these requirements having changed greatly, and the trade education system changed to a small extent, a gap exists which must be filled in.

The teaching of a trade in school has many disadvantages, due to the difference between the selfishness of the business world and the altruistic atmosphere of the school; the change from the one into the other makes the pupil a derelict on the sea of life until he finds himself; the difference in machinery employed in the factory and the school, the difference in time spent in the limited number of trades, and the limited manner in which these few trades are taught because of restricted facilities of space, money and machinery, which to be kept up to date would necessitate complete renovation about every five years—prohibitory, as is evident.

These disadvantages nullify almost completely the value of such an industrial training of the deaf as a means of livelihood.

A complete change in the system is essential—a change which would embody this principle: that the industrial education of the pupil is to be taught right in the shop itself, under real factory management, regulations, atmosphere and conditions, using the same tools as are used by the laborer in making the finished product, while the theoretic side of industrial education is taught in school.

Here it is important that some consideration be given to the method of instruction and communication of the deaf. As it is known, there are two methods—the oral and the sign. Our experience is that while articulation and lip reading are decidedly industrial assets, communication by signs and the

manual alphabet is such a social asset to the deaf, that without it they cannot enjoy life or profit by attending lectures, religious services and socials wherever and whenever they must communicate with others at a distance.

The civil service regulations of this city and state forbid employment of deafmutes. This is unfair, for there are many kinds of work they can do. The United States Government allows the deaf to take examinations in certain departments, with a string attached to it, the final appointment being left to the discretion of an appointer who has a choice of one of three.

To summarize, our activities to better the social and economic condition of the deaf are:

Employment Bureau, the social clubs, the weekly religious service, the evening classes for immigrants as a first step toward an extended evening educational system, the publication of the monthly periodical, *The Jewish Deaf*, the rendering of social service as interpreter and intermediary of the deaf in charity organizations, associations, courts, city departments and governmental agencies. Add to these, contemplated extensions which will intimately affect the hygienic life of the deaf, as well as plans tending to create strong sympathetic bonds 'twixt the deaf child and its parents, and you have a measure of how extensively the Society for the Welfare of the Jewish Deaf can mold the life of the deaf.

LVII.

SORE THROAT CLINICALLY CONSIDERED.*

By Samuel Johnston, M. D.,

Baltimore.

"The schemes of any of the arts or sciences may be analyzed in a sort of skeleton, and represented upon tables, with the various dependencies of their several parts." (Watts.)

Sore throat is defined as a popular term embracing almost every inflammation or morbid condition of the throat. (Gould's Illustrated Dictionary of Medicine.)

To study the subject clinically, as is my purpose, it is necessary to scrutinize the nasal passages and accessory sinuses as well as the oral cavity and larynx. We should also scan the physiognomy of the patient, mark well any changes in the voice tone, and note the odor of the breath, before entering into a more detailed examination of the case.

"In the early ages of medical science the doctrine of physiognomy formed an important part of all systematic teaching, and practically it is no small part of the accomplishment of a skillful physician to be able to recognize readily in any sick person the outward signs which may be characteristic of his malady." (Ord.) The staining of the skin and conjunctivæ of icterus; the flush of hectic; the cyanosed countenance of the subject of laryngeal or tracheal stenosis; the facies of the habitual mouth breather; the notched central incisors of hereditary syphilis; "the typical features of myxedema and cretinism," will serve to illustrate what may be gleaned by the close observer.

Changes in the voice are produced by such a variety of causes that it is only possible to name a few examples: paralysis of the soft palate, defects in the conformation of the pala-

*Read before the American Laryngological Association, at the Thirty-eighth Annual Meeting, Washington, D. C., May 9, 1916.

tine arch, swollen tonsils, benign and malignant growths in the nasopharynx, palsies of the vocal bands, laryngeal growths, laryngeal inflammations—all produce voice alterations to a greater or less extent.

The odor of the breath is a valuable aid to diagnosis and may direct our attention to certain morbid conditions which otherwise are liable to be overlooked. Profound uremic poisoning, now and then, is accompanied by a distinctive odor of the breath; pulmonary gangrene fills the expired air of the patient with an odor fetid beyond compare. Who is not familiar with the scent of the exhalations of the alcoholic, or of that of the victim of quinsy, or of throat syphilis, of ozena, or necrosis of the nasal bones? These are not all the conditions producing foul breath, the list may be indefinitely extended; but decayed teeth, foreign bodies, rhinoliths and disorders of the digestive apparatus may also be mentioned by way of a supplement.

With a strong light now directed into the widely opened mouth of the patient, we may proceed with the investigation of the case before us.

The lips, gums, teeth, tongue, palate, pharynx, nasopharynx, and lastly the lingual tonsil, epiglottis and larynx, in the order named, should be carefully examined.

Search for any reflexes in the nasal passages and in the external auditory canal, for often here may be found the *origo mali.*

Upon the lips, mucous patches, cysts, tubercular ulcers, cancer, malignant growths, herpes, and tertiary syphilitic ulcers may be found. The gums and teeth will be more thoroughly looked after by the dentist; but tubercular ulcers, tumors, etc., are not uncommonly located on the alveolar processes.

The bleeding gums of scurvy, and the blue line upon the gums indicative of lead poisoning, may be the first suggestions regarding these affections. Cancrum oris, herpes and thrush, commonly, and rarely pemphigus, may be looked for on the buccal mucous membrane.

Affections of the mouth form a chapter of their own. Books have been written upon diseases of the tongue, but that abscess, cancer, papilloma, gummatous infiltrations, cysts, syphilitic and

tubercular ulcers appear on this organ, and that beneath it ranula, or perhaps an imbedded salivary calculus, may be found, should be borne in mind.

The uvula may be elongated, causing in some instances distressing cough, or this member may be enormously swollen as in acute uvulitis. It is also the site of specific ulcers, or a benign, notably papillomata—or occasionally a malignant—growth may be located here.

In the roof of the mouth tumors are rare. It is, however, a favorite location for gummatous deposits, and often we see these followed by necrosis and perforation.

The tonsils may be atrophied or hypertrophied. These glands may also be acutely inflamed, followed by abscesses in the parenchyma of the gland, or in the peritonsillar tissue. In the lacunæ, calculi are sometimes imbedded, giving rise to the suspicion of a malignant growth. Mycosis tonsillaris, acute and chronic tonsillitis, diphtheria, syphilis in its various manifestations, Vincent's angina, and tumors, may be thought of in studying the tonsils.

The lips, tongue and palate, singly or collectively, may have their motion impaired or abolished, due to central or peripheral disease.

The examination of the nasopharynx should not be omitted, for besides the usual inflammatory affections of this region—namely, adenoid growths, polypi, etc.—an ulcer, usually of an infectious nature, is found here when least suspected. Retropharyngeal abscess and gumma of the pharynx are revealed as rounded swellings projecting from the surface of the normal pharyngeal wall. In recent years the lingual tonsil has been the subject of much study, but as it is liable pathologically to the same changes as the faucial glands, it will suffice to say that its abnormal growth gives rise to cough, a sense of lump in the throat, etc.

The epiglottis is the seat of acute and chronic inflammations; the former occasionally resulting in edema, though we do also find this a part of general dropsy due to cardiac or renal disease.

The microorganisms of syphilis and tuberculosis, unfortunately, too often find the epiglottis a suitable soil for their development and destructive work.

Sore throat is to a greater or less extent the accompaniment of measles, scarlet fever, influenza, typhoid fever, etc. It is a good rule to examine the body carefully as a whole in all cases of sore throat, for often the throat symptoms are only a local manifestation of a general infection.

I am aware that this list of affections causing sore throat is far from complete; it is, however, sufficient if my efforts stimulate a further study of the subject.

The diagnosis is not usually difficult if we examine the cases systematically, but should any doubt arise it is best to ask for counsel.

In regard to treatment there is no hard and fast rule. Each case must be managed in accordance with conditions present, and general medical and surgical, as well as hygienic and dietetic, principles should be the guide.

Recent studies in bacteriology have conclusively proven that many throat affections are due to microorganisms, consequently antiseptic remedies by preference should be used in the majority of cases, though the galvanocautery, nitrate of silver, iodin, chlorid of zinc, and some of the acids may be required to combat ulcerative and rebellious inflammations. A skilled surgeon should decide the advisability of operative interference.

Sanarelli states: "Numerous species of microorganisms are constantly present in the buccal secretions and upon the moist surface of the mucous membrane of the mouth. Some of these are only occasionally encountered and may be regarded as accidental; others appear to have their natural habitat in the buccal cavity. The nonpathogenic organisms possess various properties; some curdle milk, other dissolve albumin; others, again, give rise to fermentation in solutions of glucose and lactose, or invert cane sugar.

"Of the pathogenic series the bacilli of cholera, typhoid, and diphtheria, the coccus of sputum septicemia, and the diplococcus of pneumonia are the most important. The saliva of healthy persons has the power of destroying or retarding the growth of the above mentioned bacilla, but it constitutes an excellent medium for the development of the cocci."

The story told is doubtless an old one ,but I have thought that to formulate certain conditions producing sore throat and

sore mouth would be of some little advantage, and assist in their intelligent diagnosis and treatment.

If my experience in the treatment of affections of the throat and nose has proved any one thing, it is that diseases of these regions differ in no way from similar pathologic changes in other parts of the body, and should receive the same therapeutic and surgical treatment. Conservatism and mild measures, however, should be the rule for guidance.

LVIII.

EXTENSIVE KELOID OF MASTOID WOUND CICATRIX.*

By Frank L. Ryerson, M. D.,

New York.

The patient first presented himself at the clinic of Dr. Kenefick, at the eye and ear infirmary, about four weeks ago. At the time, as a matter of record, Dr. Dickson took a picture of the condition (Figure 1). The case was presented before the section to show the extensive keloid development, which seems to be quite unusual following a mastoid operation. There was no history of any keloid growth or hypertrophy of any scar tissue in the family.

The patient was twenty-seven years of age, born in Austria, and came to this country at the age of eighteen. He had had typhoid fever, but otherwise had always been well.

Two years ago, after acquiring a severe cold, the patient had a pain in his right ear, and for a short time there was a purulent otitis media. Three months later a mastoidectomy was performed at St. Mark's Hospital. After dressing the wound for about four months, the upper part healed, leaving a small wound open at the bottom, which soon healed. The tumor subsequently began to develop along the entire line of the incision. In the beginning there was an entire absence of sensation to touch, both of the ear and over the mastoid area, but during inclement weather there was a prickling and tingling sensation.

There were no scars upon the patient's body, but there were three or four on the fingers.

The tumor was two and one-half inches in length, one-half an inch wide at the base, and three-quarters of an inch wide at the top. The surface was slightly irregular; the consistence,

*Presented before the New York Academy of Medicine, Section on Otology, April 14, 1916.

firm. There was a sharp margin to the healthy skin, and no overlap at the base, excepting a small tip at the lower end.

About nine months ago the patient received a series of X-ray treatments, the duration of each being about two minutes. The last treatment was given six months ago.

It has been customary to divide keloids into two varieties—the false type, which occurs as the result of scratching, injury, burn, or syphilitic scar, and the true keloid, believed to originate in normal uninjured skin; but the case presented is apparently spontaneous, although it may be the result of a slight injury, as scratching, the occurrence of which is entirely forgotten. The tumor develops in those who show congenital or racial predisposition, and is especially prevalent among the negro race.

Workers agree that a keloid consists of horizontal strands of fibrous tissue which originate from the corium, the long axes of which lie parallel to the skin. The vessels are atrophic or completely absent. Hair follicles, glands and muscles are absent or pushed to the side of the growth. Keloids have no capsule, but merge imperceptibly into the surrounding connective tissue. They generally run a very long course; resolution is possible by simple absorption of fibrous tissue, but the tumor will most frequently recur after excision.

Successful treatment for the removal is not as satisfactory as may be desired. Surgical removal, preceded and followed by the X-ray, has given some good results. Electrolysis, cauterization and excision have been of little avail, as the growth has returned with renewed force and increased size. Partial success has been reported with hypodermic injections of fibrolysin (thiosanimin) and glycerin and water. Perhaps as good a therapeutic agent is the application of radium. A report of twelve cases by Dr. Frank Simpson of Chicago shows some good results. The dosage is determined by experience, and the most insistent keloids have been made to disappear by the more or less destructive action of the radium.

FIGURE 1.

Extensive keloid of mastoid wound cicatrix.

LIX.

CASE OF EPITHELIOMA OF THE POSTERIOR PHARYNGEAL WALL CURED BY THE ELECTROCAUTERY.*

By Dunbar Roy, A. B., M. D.,

Atlanta.

Mrs. R. B. B., aged twenty-seven years, consulted me on July 29, 1913, on account of an ulcer on the posterior wall of the pharynx. Family history was absolutely negative. Personal history: Had always enjoyed good health. No signs of cachexia or physical weakness. Syphilitic history was entirely negative, and this was true of the husband, who was closely questioned. Never suffered with her throat previous to the present attack except an occasional tonsillitis. No history of traumatism of the throat by caustics or otherwise.

For the last three months she had suffered with a throbbing soreness in her throat that was present almost continually. Had been treated during this time by another laryngologist, who used various remedies without success. Finally told her that there was an ulcer which failed to heal and in fact was getting larger all the time.

Examination showed a healthy looking woman with no signs of enlarged lymphatic glands in the neck. On looking into the pharynx there was seen some enlargement of the faucial tonsils, but otherwise healthy in appearance. At the center of the posterior pharyngeal wall, with the upper half hidden by the soft palate, there was seen a perfectly round ulcer almost one-half inch in diameter with a clean-cut border separating it from the surrounding healthy tissue. The whole ulcer was yellowish gray granular looking in appearance and apparently two or three millimeters deep. By palpation the edges were rather firm and elevated, giving the ulcer a somewhat crater shape. It seemed to dip into the pharyngeal aponeurosis. There was some pain on deglutition, but mostly

*Read before the American Laryngological Association at the Thirty-eighth Annual Meeting, Washington, D. C., May 9, 1916.

a throbbing sensation. A syphilitic ulcer was the first impression made, with a possibility of its being tubercular in origin. Questioning elicited the fact that she had already been taking mercury and iodids. A piece of the ulcer was removed with Hartman's punch forceps and submitted to a competent pathologist for immediate report. Frozen sections were made and his report was as follows: "The specimen submitted to me shows it to be a typical epithelioma of the mucous membrane."

Two days later, under cocain anesthesia, the writer undertook to destroy the ulcerative growth by the use of a sharp point of the electrocautery. A deep burning incision was made entirely around the ulceration, about three millimeters to the outside of the rim. All tissue within this ring was then cauterized as deeply and as thoroughly as possible. Sufficient time was taken to see that every point in this area had been touched by the cautery point. There was considerable pain for the first thirty-six hours, after which all discomfort began to subside.

An emulsion of orthoform was given as a local analgesic. There was very little reaction. The cauterized area began to heal and contract so that in two months there was nothing remaining but an area of white scar tissue. This gave no inconvenience and the patient has remained thoroughly comfortable. Only one application of the cautery was made, and at no time did the patient complain of pain during the operation. She was examined about the middle of April, nearly three years after the operation, and there were absolutely no signs of a recurrence.

Unfortunately, clinical observers and writers have been too prone to classify all malignant growths of the pharynx under that general term, without distinguishing between the different forms of carcinomas and sarcomas. For clinical purposes such may be sufficient, but as an aid to their treatment and probably prognosis it is very necessary for the laryngologist to distinguish between these malignant growths whenever this is at all feasible. In the large majority of cases the word "cancer" is supposed to embrace all malignant growths, and unfortunately this term is too often accepted in our clinical reports. This statement is made because in looking up the literature on the subject of this paper the writer found it

almost impossible to correllate all the cases recorded, in that many of them were reported in the most unexpected places, and not under any of the headings where one would expect to find them. Furthermore, as Morell McKenzie and others have pointed out, the disease is often so extensive when first examined that it is impossible to tell its point of origin. Since the tendency, whenever found in the pharynx, is to upward extension, malignant growths are apt to be reported under the nasopharynx, tonsils, tongue, esophagus, etc. It is surprising how very superficially this subject is treated in the various textbooks on laryngology. All of the authors seem to be of the opinion that since malignant growths are rarely seen in their early stage, but usually after they have involved the various portions of the pharynx, larynx, and hypopharynx, it is unnecessary to ascertain their true pathology, because so little can be accomplished for the patient. In fact, Dr. D. B. Kyle, who has discussed this subject more thoroughly than any other author of a textbook, has this to say: "The treatment is largely palliative, as no radical operation can be successfully performed." Of course, he means those carcinomatous and sarcomatous growths where the surrounding tissue is infiltrated together with the lymphatics, and where it would be utterly impossible to eradicate the growth. But simple epitheliomatous ulcers may occur in the pharyngeal cavity which can be successfully destroyed by the electrocautery, and in these cases the prognosis is not quite so grave as in other forms of malignant growths.

The writer has been unable to find a case similar to the one here reported. As was stated above, all writers speak of malignant growths, meaning carcinoma as well as sarcoma. The only case found in the literature which is at all parallel is the one reported by Henri Aboulker[1] from the hospital in Algiers. This was a case of epithelioma in a man sixty years of age, which had invaded the left half of the velum, extending to the tonsillar region, to the lateral part of the base of the tongue and to the lateral wall of the pharynx, who was operated upon by pharyngectomy, and who remained cured three and one-half years after the operation. This writer says that in seven out of eleven cases of oropharyngeal epithelioma his results had been successful. He also makes the interesting statement that

Kronlein's statistics give thirty-nine per cent of deaths from operation; Czerny, thirty-nine per cent; Vallas, thirty-seven per cent. Aboulker states that these are practically the only series of such operations which have been published. He believes, in brief, that out of one hundred patients operated upon, sixty survive at the end of six or three months, or even granting that they all die, then they have lived as long as the patients who were not operated upon. Their end is not as horrible as that of patients left to themselves. It is not the intention of the writer to discuss the prognosis and treatment of malignant affections of the pharynx, nor to give any statistical presentation. This has been very thoroughly accomplished in articles by Prof. G. Ferreri of Rome[2] and Chevalier Jackson.[3] The article by Ferreri is very complete and well worth reading, because of his eminently conservative radical treatment of this subject. Under the surgical treatment, this author cites Trelat as declaring that it is useless to intervene in the case of epithelioma of the pharynx. He believes that electrolysis offers the best chances for the patient.

Jackson, in reviewing the subject, has this to say: "Primary carcinoma of the nasal fossæ is rare, yet most rhinologists of considerable experience have seen them. Primary carcinoma of the nasopharynx is so rare, judging from the fewness of reports, that but few rhinologists have ever had one case. A careful search of the various indexes of the medical journals published in French, German, English, and Italian during the last twenty years had failed to unearth more than fourteen cases. It is probable, however, that some reports have not been found; others have doubtless escaped because buried under misleading titles. Cases primary in the tonsil, nasal fossæ, antrum and brain, probably have been reported, if at all, as of those regions. Politzer mentions five cases where the eustachian tube was involved by cancerous extension from the tongue and the superior maxilla, but none of these seem to have been primary in the nasopharynx. It scarcely seems possible that all medical records should contain so few as fourteen cases of carcinoma of the nasopharynx, yet Moritz Schmidt, in a total of 32,997 nose and throat patients, did not meet with one case, though seventy-five of laryngeal carcinoma were seen. Reports of five cases were

collected by Bosworth in 1889, to which he added one of his own observation. To these I have added eight, including one of my own, making fourteen in all, tabulating them as well as the incomplete report would permit. The table is incomplete, because five of the cases were evidently not under observation to their termination, and consequently only record symptoms to a certain stage. All of the cases were primary in the nasopharynx, with the possible execption of Latzbeck's, in which the nasopharyngeal portion was discovered at the autopsy."

The treatment is considered under: (1) radical (operative), and (2) palliative (cold snare, cutting forceps, curette, electrolysis, galvanocautery, lactic and nitric acid, "some other caustics," soothing applications, chian turpentine. In only one of the fourteen cases collected was galvanic ignipuncture employed. Death.

Pathologists place carcinomata or socalled cancers under the head of epithelial tumors, because in their structure they are made up of cells of the epithelial type.

They are usually divided into two groups:

1. Acinous cancer with scirrhus or chronic cancer and encephaloid or acute cancer as subdivisions.

2. Epithelial cancer, including squamous or columnar epithelioma.

It is unfortunate that reports of cancer of the throat are not more definite as to the specific nature of the growth. For instance, the encephaloid variety is more malignant and more speedily fatal than the scirrhus. Colloid degeneration of these growths seems to diminish their malignancy. Every now and then an encapsulated tumor is met with, especially in the soft palate (Green), showing no signs of malignancy and yet having the structure of acinous cancer. Then, again, in the variety known as atrophic scirrhus the disease is not uncommonly from ten to twenty years, and the extension only local and glandular.

Epithelioma pathologically is much the least malignant of the cancers, and consequently more amenable to treatment, such as by the use of the electrocautery.

Green in his textbook says epithelioma extends locally, breaks down early and often infects the neighboring lymphatics, but rarely reproduces itself in internal organs. This is

probably owing to the size and character of its epithelial elements, which render them much less liable to transmission by the blood and lymph streams than the cells of the other varieties of cancer.

Its malignancy varies curiously with its seat: thus on the skin of the face it has generally a very chronic course and rarely affects even the glands; on the lip early excision gives a fair chance of cure; on the tongue its course is often so rapid, affection of the glands so early, and cachexia and death so speedy, that it must be ranked as one of the most malignant tumors.

In the case here reported the large ulcer on the posterior wall of the pharynx had some of the characteristics of the so-called rodent ulcer sometimes seen on the nose and cheek, and which pathologists place under the head of epithelioma. This case was the type known as "columnar celled epithelioma" or "adenoid cancer," showing also some squamous cells just as transformation of these growths takes place inside of the uterus. These terms are applied to forms of epithelial cancer which grow from mucous membranes of the columnar or cylindrical epithelium variety. They have a great tendency to undergo colloid degeneration. For this reason writers in reporting cases of malignant growths in the throat should certainly try to state exactly the pathologic character of the same, in order that any statistical presentation in the future might be more accurate. Furthermore, we would be in a better position to pass judgment on the final result accomplished by the treatment if we knew the character of the malignancy.

It has now been three years since the case here reported was healed, and there has been absolutely no signs of a return. The results obtained in one case, especially of a cancerous type, certainly does not justify any positive deductions, but the writer believes that the thorough and judicious use of the electrocautery offers the best chance for a good result. In cases where the growth is limited to those portions of the pharynx which are easily accessible, and where they are of the flat ulcerative type, as in the case here reported, it certainly seems to me that such a method would be able to eradicate the growth far better than any cutting operation, especially if the glands and lymphatics were not also involved.

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LX.

DIFFICULTIES AND COMPLICATIONS OF SPHENOPALATINE GANGLION INJECTION.*

By Harry L. Pollock, M. D.,

Chicago.

In a paper read before the North Shore Branch of the Chicago Medical Society last year, entitled "The Injection of the Sphenopalatine Ganglion in Some of the Commoner Diseases of the Nose,"[1] I described the regional anatomy of the ganglion, the technic of the injection, and the indications for the procedure.

Regarding the technic, I stated that if the anatomy is known and the landmarks present, the matter of injection is a simple procedure. I further stated that if the technic is carefully followed there could be no serious complications. At that time there was a complication following one case only, and that was an ecchymosis in the cellular tissue below the eye. Since reporting these cases, I have had several other complications, and have noticed in the literature that others have also had difficulties following the injections, consequently this report.

The indications for the injection of the sphenopalatine ganglion are the same as those I described in the previous paper, with the exception of hay fever. This is because in the past year we have had better results with the use of autogenous pollen in hay fever.

It is my belief that sphenopalatine ganglion injections are indicated in the following three conditions:

1. The true sphenopalatine syndrome, as first described by Sluder.[2] This consists of various degrees of pain radiating to any or all parts supplied by branches of the ganglion. The usual location of the pain is over the root of the nose, in and about the eye, over the frontal region, in the pharynx and tonsillar region, in the ear, back of the mastoid, over the occiput,

*Read before the Chicago Laryngological and Otological Society, April, 1916.

down the neck, shoulder, the arm, and at times into the fingers. In a majority of cases one or more of these points are involved, but I have never seen a case where all points were affected at the same time.

2. Hyperesthetic rhinitis, which is similar to hay fever, except that it comes on at any time of the year and is irregular in its time of appearance, its duration and severity. Often the paroxysms are brought about by contact with a specific kind of perfume, a particular flower, or the odor from various animals, a slight draft of air, or inhalations of dust. These paroxysms begin with attacks of sneezing, varying in number from twenty to forty or fifty, followed immediately by a nasal hydrorrhea—i. e., a profuse watery discharge from the nose and lacrimation. These symptoms may continue for hours and suddenly abate, only to be repeated on succeeding days, or when again brought into contact with the specific irritant. These attacks may last a few days, or may continue for a week or longer. If the nose be examined between the attacks, the appearance is usually normal except for a pallor of the mucous membrane; but if examined during the attack, the turbinates are turgescent and the mucous membrane red and congested.

This condition has since been described by Sluder[3] as the sympathetic syndrome, an affection of the sympathetic portion of the ganglion controlling the vasomotor and secretory function rather than the sensory. I readily agree with Sluder, except in one particular. He states that there is always a slightly sensory involvement, as manifested by a slight pain or neuralgia. In most of my cases there has been absolutely no pain present, the only symptoms being profuse hydrorrhea and sneezing.

3. Postoperative neuralgia—i. e., where the syndrome or a portion of it makes its appearance only after intranasal surgery has been done—usually following ethmoid exenteration or some work on the sphenoid. In these cases, although the majority were suppurations of long duration, there had been no pain until after the surgical interference.

TECHNIC.

First cocainize the posterior ends of the middle turbinate and the wall immediately behind it, with a twenty per cent

solution of cocain. This procedure is also used as a diagnostic measure, and we often find that the neuralgia for which the injection is to be done is immediately relieved. In those cases where relief is immediately obtained, the prognosis from the sphenopalatine injection is always good; but in those cases where not much relief is obtained, but where the pain is sometimes made worse, the prognosis is bad.

After anesthesia is obtained, with a long straight needle transfix the posterior end of the middle turbinate and press the needle upwards, backwards and outwards until the bony wall is felt. This is the anterior wall of the pterygomaxillary fossa, in which the ganglion is situated. Continue the pressure so that the needle passes through the bone into the fossa. This bone is at times very thin and at other times quite thick, so that oftentimes a great deal of pressure is required.

By the pressure sense one usually feels the needle pass into the cavity. The ganglion is usually situated 0.66 centimeters back of the wall (Sluder). The syringe is now attached and a few minims of a two per cent solution of phenol in pure alcohol are injected. If the ganglion has been penetrated by the needle, the patient will at once complain of excruciating pain, radiating from the eye to the ear and mastoid over the occiput and down into the shoulder. This severe pain lasts anywhere from three to forty-eight hours, and is not fully controlled by large doses of opiates. The prognosis in these cases is, however, usually very good, as we know that the phenol alcohol has been injected into the ganglion itself and not into the loose cellular tissue surrounding it.

While the technic as above described is usually quite easily followed, there are certain conditions which make the procedure very difficult.

First—A marked deflection of the septum, a large ridge low down or a split anterior cartilage, would render it very difficult for the needle to transfix the posterior end of the middle turbinate and then be pushed in the right direction. Ordinarily the proximal end of the needle pushes the tip of the nose to the opposite side, but if there is any obstruction, this is not easily accomplished.

Second—In practically all of the postoperative neuralgic and typical syndrome cases where operative measures have

already been performed, our most valuable landmark has been obliterated—namely, the posterior end of the middle turbinated body. Many of these cases come to us with the interior of the nose cleaned out and the area occupied by cicatricial tissue, so that the landmarks are not available. Knowing that the point of attack is external to the sphenoid sinus, one can usually be reasonably sure of the correct point if this relation to the sphenoid is borne in mind. Then again, the sphenoid sinus is variable in its size and position, and occasionally one penetrates this sinus and believes that the point of the needle is in the pterygomaxillary fossa.

Third—Probably the greatest difficulty lies in the thickness of the bone forming the anterior boundary of the fossa. In the majority of these cases, if great manual pressure is exerted, the needle will pierce this wall; but I have had cases in which this was impossible. Quite frequently I have resorted to the hammer, and have been compelled to employ great force in driving it through the wall. Care must be taken not to break the needle during this manipulation. There is another objection to the use of the hammer, and that is, one cannot feel the needle slip into the fossa. In several cases I was unable to get through this anterior wall, and explained to the patient that it would be necessary to drill through, but was refused this privilege and was compelled to desist all further attempts.

One of the unpleasant occurrences which I met with was having the phenol alcohol solution run down the pharyngeal wall and into the throat, sometimes into the larynx. This, of course, only occurs when the needle has not penetrated the wall.

The complications following this simple procedure are not numerous, but if it is known that they do occur, much anxiety to the patient as well as to the operator may be avoided. Judging from the literature upon this subject, and from our personal experience, I should say that secondary hemorrhage is the most frequent complication.

Holmes[4] and Sluder[5] both report this condition coming on several days after the injection. The first complication which I desire to report is one of severe secondary hemorrhage.

Case 1.—Miss K., aged thirty-eight years. Referred to us complaining of severe headaches and pain in the infraorbital region, of several years' duration. Has had various kinds of

internal medication, and also has had external branches of the fifth nerve injected without material results. A left sided sphenopalatine ganglion injection was advised, and was done March 1, 1915. At the time of injection there occurred an unusual amount of bleeding, but this was easily controlled. When the patient left the hospital on March 2nd there was no evidence of any bleeding. On March 5, 1915, at 9:30 p. m., I was called up by the family physician, who stated that just as the patient was leaving her work at 6 p. m. she had a severe and violent hemorrhage from the nose, which necessitated calling a local physician, who packed the nose. She was carried back to her office, where bleeding continued slowly, notwithstanding the packing. When the patient was brought to the North Chicago Hospital in an ambulance about 10 p. m., she appeared exsanguinated, almost pulseless and still bleeding. I removed the packing and found two small pieces of gauze loosely packed in the anterior portion of the nose. After inserting a postnasal tampon and packing the nose solidly with gauze, the bleeding stopped. The gauze and tampon were removed in three days, with no further bleeding. The bleeding four days afterwards was not due to any septic process, but probably to the alcohol, which caused an erosion of the sphenopalatine artery. This patient was injected again three months later without the slightest tendency to hemorrhage.

In my previous paper I reported a case in which swelling and ecchymosis appeared in the cellular tissue beneath the lower lid, completley closing the eye. This disappeared in a few days without any further trouble.

The second complication which we have had was a paresis of the abducens, occurring within forty-eight hours after the injection.

Case 2.—Miss W., referred by a specialist on July 23rd, 1915, who had had the patient under treatment on account of severe pains in the back of eyes, in both temporal regions and back of ears over mastoid region, also down the arms into fingers. Pain in teeth at times, especially in left upper premolar. All pain more severe on the left side. At one time the pain extended into chest.

Examination showed thorough exenteration of the ethmoidal

region. Good breathing space. Sphenoids and frontals open, teeth in good condition, tonsils thoroughly enucleated.

Diagnosis, sphenopalatine neuralgia. Advised injections of ganglion.

On July 23rd my associate, Dr. J. C. Beck, injected the left sphenopalatine ganglion with a few minims of a five per cent phenol alcohol solution. There was not much pain from the injection nor much relief from symptoms.

July 29th. There being no cessation of the symptoms, I injected the same side. I had no difficulty in penetrating the wall and entering the fossa. Injected a larger amount than usual, about ten minims. She immediately had a severe pain in her left eye over her left mastoid and in the occiput.

July 30th. Pain still severe in and about the left eye. The other pain less.

July 31st. Still has pain in eye, and there was noticed a swelling in the infraocular tissue. Complains of diplopia and some blurring of vision. Examination shows paresis of the external rectus, but there is no change in the fundus.

August 2. Vision still blurred. Has had considerable pain in left eye for two days.

August 4th. Pain in left eye. Vision 20/20 in both eyes with her correction, but diplopia is still present; which, however, is corrected with a prism of 9° base out, 6° base down. More pain in attempting to look up. Returned to her home.

August 16th. Received a letter from her physician stating that the pains were the same.

Diplopia continued, requiring a prism of 16° to give single vision.

September 5th. There is an improvement in pains and the external rectus only requiring a 7° prism to overcome.

October 3rd. The eye has entirely cleared up, but general condition just the same as before the injections.

We were at a loss at first to understand the cause of this unusual complication. It was not until just recently that I read Dr. Sluder's latest paper, in which he reported a similar case in which the paresis cleared up in eight weeks and the diplopia in twelve weeks.

With a knowledge of the relation of the pterygomaxillary fossa to the orbital cavity, and knowing that the abducens is

the smallest and most vulnerable of all the cranial nerves, I think we can readily explain this complication which we had.

The orbit is connected with the sphenomaxillary fossa by the large orbital or sphenomaxillary fissure. The fossa containing the ganglion is filled with loose cellular tissue which extends into the orbit. As stated before, I employed a larger amount of alcohol than usual, and most probably some of it found its way into the orbital cavity and attacked the small nerves, causing this temporary paresis.

The patient returned December 20, 1915, not having any cessation of the symptoms, for further treatment. Ganglion was injected twice with the same solution as formerly, without any appreciable relief. There is, however, no recurrence of the paresis.

Case 3.—Mrs. C. C. H., aged fifty-two years. June 10, 1915. Referred by Dr. P. For eleven years complained of pain, extending over right side of head and through right eye. This condition gradually became worse. The pain, starting over right eye, radiated over top of head to the mastoid and down into the right shoulder, sometimes going into the throat. Cold or heat does not relieve it. Had nose operated upon six years ago. Sixteen years ago had laparotomy, ovary and tube having been removed. Five years ago had operation on muscle of right eye, since which time she has had diplopia. Supraorbital nerve injected with osmic acid, after which the muscle over eye became paretic. Has had alcoholic injections into infra- and supraorbital nerves, without any relief. Two Wassermanns were negative. Also treated with iodid of potassium, without relief. X-ray pictures show nothing abnormal. Menopause three years ago. Nose and sinuses examined four years ago by specialist, who found nothing abnormal.

Examination of right nostril, normal.

Left nostril showed no evidence of pus or polypi. Slight irregularity of the septum. Throat and ears negative. Five grain doses of aspirin control pain for about five hours, and then it reappears, necessitating the administration of more aspirin.

Diagnosis, sphenopalatine neuralgia. Injection advised.

June 13th. Right sphenopalatine ganglion injected by Dr. J. C. Beck. The pain became more severe, and about five

hours afterwards it was necessary to give aspirin for the control of same.

July 14th. Condition the same.

July 16th. I injected the right sphenopalatine ganglion again with one per cent solution of phenol alcohol. Apparently the ganglion itself was injected, as the typical results were obtained. For several days following the patient was very much better, although still not free from all the pains. There seemed to be some slight pains around and in the right eye.

Patient remained in hospital for ten days and then was discharged and told to report in one week.

July 20th. Was called to see patient at her home, in consultation with her family physician, from whom I elicited the following:

Four days after leaving the hospital she suddenly developed a severe pain in right leg, which caused her to go to bed and call the physician. She was unable to bend the leg or even to move it. The diagnosis was sciatica, for which he was compelled to give aspirin and opiates, which only partially controlled the pains in her leg. The pains in her head were all gone, due to the opiates and aspirin.

July 22, 1915. Her condition was improved, although she could not walk without crutches. Was in bed for several months following the time I saw her at her home. The former pains in the head and face are worse than ever.

There is no anatomic physiologic connection between the sphenopalatine ganglion and the sciatic nerve, yet I am forced to include this unfortunate condition as a complication, because of the fact that it came on a few days following the injections of the ganglion, while the primary condition has existed for over eleven years. That the causative agent for the two conditions might be the same is possible, yet from the above facts it must be considered as a complication.

CONCLUSIONS.

The injection of the sphenopalatine ganglion is usually carried out without any difficulties. The difficulties are in a majority of the cases overcome if one is familiar with the regional anatomy.

The complications are not numerous nor severe, but one

must be watchful and bear in mind that they do occur and be prepared to meet the emergencies as they arise.

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LXI.

INTRAMURAL MALIGNANT TUMOR OF THE LATERAL WALL OF THE NASOPHARYNX.*

By Edward P. Norcross, M. D.,

Chicago.

Cases of primary malignant growth of the nasopharynx are of rare occurrence. In the textbooks there is little or nothing mentioned about such tumors. There are numerous reports of single cases, but the description is so indefinite in many of them that it is not possible to ascertain whether the tumor really originated in the nasopharynx or elsewhere. In other reports the diagnosis cannot be considered as definite, because the description of the character of the growth is not exact and permits of various explanations.

By primary carcinoma of the nasopharynx I refer only to those growths that clinically as well as histologically are malignant from the beginning and originated in the nasopharynx. I have, therefore, ruled out of this discussion all malignant tumors of the nose and of its accessory cavities, tumors of the pharynx, primary tumors of the cervical glands, and all tumors of the nasopharynx that are the result of metastases, or the encroachment of malignant growths from neighboring structures.

In reviewing the literature up to the spring of 1913, I found very few reports of primary malignant tumors of the nasopharynx, and especially of primary carcinoma. As late as 1901, Chevalier Jackson[1] reported a case of primary carcinoma of the nasopharynx, with the statement that in the German, English, French and Italian literature of the last twenty years, he could find only seven reports of primary carcinoma of this region, in addition to six cases reported by Bosworth.[2] To

*Read before the Chicago Laryngological and Otological Society, March, 1916.

these Jackson added one, and of these fourteen cases no two were reported by any one observer, the earliest being that of Durand Fardel, in 1837. Laval,[3] in 1905, reported seven cases of carcinoma observed by himself, and seventeen cases collected from the literature up to that date, the earliest being that of Michaud, in 1845, and nine of which were not cited by Jackson, whilst we find seven cases in Jackson's statistics that are not mentioned by Laval.

Since the publication of these two papers, primary malignant tumors of the nasopharynx have either increased in frequency or are being more accurately observed. In 1911, Citelli,[4] of Catania, reported ten cases observed by himself, four of which were sarcoma and five carcinoma. In 1913, E. Oppikofer,[5] of Basel, reported a series of twenty-one cases of malignant tumors of the nasopharynx, which he had personally observed since 1893. Strange to say, he observed only three of these during the time from 1895 to 1901, and the remaining eighteen cases since that date. Six of these cases were carcinoma. Oppikofer ascribes this to the progress in the technic of examination.

Trotter[6] reports a series of twelve cases. Compaired,[7] Aboulker, and others, report several cases of their own.

Furthermore, I might call attention to the statistics of Moritz Schmidt, of Prague, that of about thirty-eight thousand nose cases treated in the clinic, not a single case of primary malignant tumor of the nasopharynx was observed.

Since I made the above review of the literature there have been two papers on the subject in the American literature, one by Kelsey and Brown,[8] appearing in 1913, and the very recent report by Dr. W. E. Gatewood,[9] of Chicago, of two cases that were observed in the Presbyterian Hospital in the years 1909 and 1910.

Having called your attention to the infrequency of these primary tumors, and, because they present such definite symptoms, based upon an anatomic foundation, the report of even a single case seems justifiable.

The case I wish to report was first seen by me November 16, 1912. The patient was a young woman, twenty years of age. Her family history was negative, as was also her past history, as to illnesses. She consulted me because of a small

gland that had recently appeared at the angle of the left jaw. Her tonsils had been removed two months before seeing me. She did not complain of anything except the gland in the neck. General nutrition was excellent. My opinion was that the enlarged gland was due to absorption from a fragment of the left tonsil, enclosed in adhesions to the pillars. She returned to the physician who had removed her tonsils, and had this fragment excised. I did not at this time examine the nasopharynx.

I did not see her again for a year, during which time many of the deep cervical glands on the left side had become enlarged, and a few on the right side were palpable. She had lost about ten pounds in weight, and stated that she was not hearing well. A diagnosis of probable tuberculosis of the cervical glands had been made, and these were removed on both sides of the neck. The pathologic examination of the glands showed them to be carcinomatous. I had an opportunity to examine her soon after the operation. Anterior rhinoscopy did not show anything unusual. Posterior rhinoscopy showed that the postnasal space was much smaller than one would expect to find it. There was no tumor mass visible, but the left lateral wall looked infiltrated and was hard to the touch. This infiltration extended down the lateral pharyngeal wall. The soft palate was asymmetrical, but did not bulge. There was a moderate degree of middle ear deafness in both ears. She complained of some neuralgia in the side of the face.

Up to this time the patient had not felt very ill. She had not considered her condition serious, and had married shortly after I first saw her. During the year following the neck operation she grew rapidly worse. Nasal respiration became difficult. She lost weight rapidly, and there was marked bulging of the soft palate, with ulceration, and a profuse secretion from the throat, with very foul odor.

She was noticeably deaf—whisper voice was heard only about two inches from the ear. Rinne was strongly negative. The upper limit remained high. The membranæ tympani were congested, and there was absence of light reflex. There was marked anchylosis of the temporomaxillary jôint, so that the teeth could only be separated about half an inch. The pain in

the forehead, face and neck was so severe as to require very large doses of morphin.

The patient died two years and three months after I first saw her. An autopsy had been promised, but at the last was refused.

Very little can be said as to the etiology of postnasal carcinoma. Most of the cases show that the patient has been of sound and healthy origin, and had not had any serious diseases. It is an interesting fact that carcinoma of the nasopharynx occurs in early childhood. The youngest case that I have been able to find in the literature is the one reported by Oppikofer, in a girl, thirteen years of age.

As to the original site of the tumor, it is usually in the lateral wall of the nasopharynx, although it may arise from the vault and spread to the side. Frequently the case is seen so late that it is impossible to determine the exact origin of the mass. Early in the course of the disease it may only be indicated by inflammation of the lateral wall. At such a time anterior rhinoscopy reveals nothing abnormal, and even posterior rhinoscopy may be apparently negative.

The trouble with hearing is one of the earliest symptoms, and this would point to the lateral wall of the nasopharynx as the most frequent starting point of the disease.

The symptoms of carcinoma of the nasopharynx are interesting, first, because in the early part of the disease there is very often entire absence of symptoms that ordinarily could be interpreted as due to disease of this locality, and, second, because such tumors frequently present a clinical picture of remarkable similarity, due to the fact that their origin in the lateral wall of the nasopharynx involves the inferior division of the fifth nerve, the orifice of the eustachian tube and the levator palati muscle.

Frequently the first symptom complained of is the pain in the area of distribution of the third division of the fifth nerve. Later the pain may spread to the second division. This pain may have existed many months, and the treatment may have been directed to that of trigeminal neuralgia. The pain varies in intensity, but is frequently excruciating and worse at night.

Cases have been reported where the growth has spread through the foramen ovale and involved the Gasserian gan-

glion, so that we must think of the possibility of a postnasal growth in considering a Gasserian ganglion operation in the treatment of intractable trifacial neuralgia.

The paper by Plummer and New,[10] 1914, concerning a tumor of the middle cranial fossa involving the Gasserian ganglion, is a good illustration of this. It is also possible that the ganglion, which lies near the junction of the roof of the pharynx and the posterior wall, is irritated at the time when the growth is extracranial.

As the tumor originates in the lateral wall of the postnasal space, the eustachian tube is early involved, and middle ear deafness may be the first symptom complained of. Cases have been reported where a transudate formed in the tympanum, or where a suppurative otitis media, with rupture of the membrana tympani, occurred. Oppikofer reports one case in which a mastoid operation was performed on account of the discharge and the otalgia.

Enlargement of the glands of the neck often occurs early, and may be the symptom which brings the patient to the physician. The enlargement of the glands may be out of all proportion to the size and intensity of the primary growth. This adenitis usually appears below the upper insertion of the sternomastoid, and behind the angle of the jaw.

Citelli reports a case similar to the one which I have cited above, in which the enlarged cervical glands were removed before the primary tumor in the retronasal space was diagnosed.

Trotter lays stress upon the finding of some abnormality of the soft palate of the same side. He states that the defect is an inability to lower the soft palate on account of infiltration preventing relaxation of the muscles, and is not due to involvement of the nerve supply. The palate looks asymmetrical, but the patient cannot raise the palate well.

If the tumor proliferates not only into the nasal cavity, but also into the maxillary sinus, there may be severe pain in the area of the second branch of the fifth cranial nerve, and bulging of the anterior wall of the maxillary sinus and the hard palate.

Only a few autopsies of malignant retrotarsal tumors are reported in the literature. Whilst the cervical glands are

affected almost without exception in the earlier or later stage of the disease, metastases in other organs are very rare.

The prognosis is absolutely a bad one. Trotter states that he has not observed a single case that lived over fifteen months after the first examination, and this statement is borne out by reports from other clinicians.

In conclusion, I wish to again call attention, first, to the fact that so many of these cases do not complain of symptoms that would be attributed to the postnasal space. In my case nasal obstruction was one of the last things complained of. Second, of the importance in cases of trigeminal neuralgia of making a careful postnasal examination and testing the hearing. Third, enlarged cervical glands may be due to an unobserved carcinoma in the lateral wall of the postnasal space.

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LXII.

FURTHER OBSERVATIONS ON THE RELATION OF AUTOINTOXICATIONS TO ACUTE MEMBRANE DISTURBANCES.*

By Sargent F. Snow, M. D.,

Syracuse, New York.

In 1908 I began a series of articles on the relation of autotoxic states of the system to inflammatory processes. Of this series, in which this is the seventh, two were read in 1909, one before this society, and one before the Sixteenth International Otological Congress at Budapest. In 1912 another came before this society, and during the years 1910, 1911, and 1915, papers before other medical societies, state or national, were read by the author, all calling attention to the intimate relation that appeared to exist between autointoxications and inflammatory activities, so that we may call this paper a "Further Observation" on the Relation of Autointoxications to Acute Membrane Disturbances.

In presenting such a paper, I will try to show as clearly and concisely as possible the conclusions drawn from a twenty-five years' practice devoted exclusively to the ear, nose and throat, twelve years of which has included active dispensary and hospital work, the whole twenty-five years having practically been employed in meeting and combating membrane disturbances. The views set forth need not be accepted as authoritative, for they are largely personal views and may be at variance with some generally adopted, but they are presented with honesty of purpose and the hope that they may help clarify the situation as to the fundamental principles involved in handling at least common head colds and allied inflammations of the accessory sinuses, ear, mastoid, pharynx and larynx.

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*Read before the American Otological Society, Washington, D. C., May 10, 1916.

Let us start with the premise that the human body is a fortress, equipped with munitions of war, and a fighting army; that for the ordinary diseases it has a trained army of body cells, capable of withstanding the onslaughts of an outside enemy, if our body functions are working so well that we have not an inside enemy undermining our resistance.

For the extraordinary diseases, such as smallpox, typhoid, typhus and other acute scourges of mankind, our system seems to require inoculative protection to especially train body cells against those particular kinds of infection, as was so ably pointed out by Professor Vaughn[1], at the last meeting of the New York State Society in Buffalo.

All our respiratory membranes and the membranes lining connecting cavities are the common habitat of various inflammatory bacteria of outside origin, ready for propagation and development as soon as our army of defense becomes weakened or is called upon to subdue some inside enemy. This inside enemy seems to be always with us in the form of intestinal bacteria, believed by Combes, an excellent authority on autointoxication, to be "provided by nature to complete digestive processes." But these same digestive bacteria, under putrefactive influences, may become overabundant and their toxins a menace, unless kept under subjection by inhibiting liver and other bacteriolytic secretions from above.

I, myself, freely accept the belief that we should maintain a proper balance between the inhibitory intestinal juices of the upper bowel and the bacteria of the lower bowel; while such a balance is kept, we need have no fear of colds and other common membrane congestions. In other words, the determining "cause of membrane inflammations" seems to rest upon the question whether our protective army is in full array, or is engaged in a battle with a putrefactive disturbance in the intestinal canal. If it is engaged in such a battle, it leaves our nose, ear and pharynx membranes unprotected and a prey to pernicious microorganic tenants. Concisely stated, intestinal autointoxication seems to permit the development of inflammations elsewhere. An autotoxic state favors acute membrane disturbances—our patients are then vulnerable to outside infective influences.

By autointoxication is meant those self-poisoned states that come from bacteria originating within our body, not autoinfections that come from bacteria originating outside our body.

Some autointoxications are active, resulting in socalled bilious attacks, etc.; some are passive and more chronic, resulting in sensitive cachectic individuals prone to various disorders.

Some autotoxic attacks are only attended by a slight malaise; other attacks are more pronounced, showing fever and a general systemic disturbance. The first mentioned kind is often periodic and is the actual basic cause of many of the chronic diseases of the body, while the more active and profound autotoxic states seem to furnish the groundwork of destructive inflammations.

Sir Arbuthnot Lane, the famous English surgeon, is reported to claim that "most of the ills and diseases that the flesh is heir to are of autotoxic origin, and that were it not for intestinal stasis and autointoxication there would be no need for physicians and surgeons."

In my 1910 article I find the following: "If we are able to handle and prevent acute inflammation of the respiratory membranes, known as common colds, by recognizing and treating the patient's autointoxication, what may we not hope will some time be done with the more grave affections. It appears to the author like the dawn of a new era, and he hardly dares let his fancy travel."

Today, in the year 1916, it would seem that scientific workers, supported by laboratory findings, were bringing my dreams true, and that my earlier articles did rightly predict the dawn of a "new era" in medicine.

The most prominent causes of an autotoxic state are lowered vital powers, overeating, constipation, or at least inadequate bowel movements—bowels perhaps correct, so far as regularity and number of passages are concerned, but the stools are compact or hardened masses that represent what a distended, overloaded colon can no longer retain—a marked intestinal stasis—being a habit rather than the needed free unloading of soft feces two or three times a day. In autotoxic subjects the transition from a healthy state to one of acute inflammation is often but a short step. The toxins that arise from putrefactive

changes in a constipated subject permeates the whole system and saps his vital resistance.

It is not irrational to expect that incompetency of the ileocecal valve with regurgitations is a common cause of ileal stasis, as suggested by J. H. Kellogg.[2]

Autointoxication is practically the determining cause or systemic condition that permits inflammations. I say permits, because nature seems to have given us immunity from most outside germs if our functions are working properly.

Quoting from my last paper before this society, published in October, 1911,[3] I note this was said: "Autointoxication has a multiplicity of causes, each one leading up to a time when the system can no longer tolerate its load of poisonous substances. The different organs and membranes of the body are forced to do, and will do, double eliminative work until some organ fails or flags in its function; then we have an acute inflammation in some part of the body from the faulty metabolism—an autotoxic crisis."

Quarantine and sanitation are solving many problems that have to do with our outside enemies, but the problems surrounding questions of diet, digestive function, eliminative organs, and how to keep our inside enemies under subjection are still open to much study and investigation—in fact, they are the pregnant medical questions of the day, and I hope will soon be taken up with more energy than is now displayed.

We are not sure yet whether food should even be cooked or baked. We certainly were not created to gorge ourselves with the conglomerate, but attractive combinations often set before us. It is no wonder that our liver and digestive secretions fail in their task to keep the proper balance. Temperance and caution in eating are quite as essential as temperance and caution in drinking. Overindulgence is quite as disastrous in one as in the other, if we take into consideration the many afflictions that can be traced back to self-poisoning.

I would place special emphasis upon the need of local efforts, surgical and otherwise, towards keeping inflammations within bounds. We must not disregard the knife, nor delay its use, to prevent absorption of pus products, but we are all justified in attempting to avoid operations when the case is seen reasonably early. It can hurt none of us to give a little more consid-

eration to the fundamental causes of inflammatory actions and be a little less led by the glamor of brilliant operating.

When the patient is "ripe with pus" because of bacterial virulence or delay in seeking medical advice, we have no alternative but to secure free and adequate drainage at once; but if he is seen early, before pus formation, we can very properly and safely expect good effects from our "emergency agent," calomel, given freely and fearlessly under twentieth century methods.

The scope of this paper does not permit me to go very deeply into the question of treatment. My personal method in all acute membrane inflammations is to start with calomel, two to four grains, in quarter grain doses, according to the case, repeating it next day if marked activity persists. In mastoid troubles I frequently start with an enema; in fact, I cannot speak too earnestly nor urge too strongly a prompt, efficient clearing of the bowel in all acute inflammations, even if only salts or castor oil are chosen.

The prejudice against calomel has deterred and is even now preventing its use in many cases of acute membrane disturbances where its proper employment, as a stimulant to antitoxic secretions, would give much relief and be likely to save the patient from the knife. My records are so replete with instances where startling and impressive results have followed the adequate use of this form of mercury even in streptococcic infections, before or after operating, that I would urge all to throw aside their fear or prejudice and give it a trial in these dangerous cases, both as an emergency cathartic and antitoxic stimulant.

As early as the year 1909, in the paper of this series presented at International Otological Congress held in Budapest, the following observations were made: "Calomel, we know, not only eliminates autoinfective material, but it disinfects the lower bowel. It also stimulates functional activity of the liver and of the glandular structures of the body, so that their secretions act as effective antitoxins against bacterial invasion and consequent active membrane congestions." The idea that mercury stimulated the production of body antitoxins was the only way I could then explain clinical results, and this has actually been my belief since 1905. Now, seven years later, my atten-

tion has been called to the fact that Professor Sajous[4] makes the same claim as to the ability of mercury to stimulate body antitoxins, calling them autoantitoxins, explaining how they are produced, as follows: "The various salts of mercury owe their therapeutic value to the energy with which they stimulate the test organ," which he concludes is the anterior pituitary body. "Only small doses (one-tenth grain) of calomel are needed to excite the test organ, and make the blood autoantitoxic, but if flushing of the intestine is desired and a copious flow of antitoxic intestinal juice in addition to the hepatic action, larger doses (one-sixth to one-half grain) every fifteen or thirty minutes until one or two grains are taken, may be ordered."

He further says: "The bacteriolytic and antitoxic activity which the blood and the intestinal juices acquire under the influence of mercurials accounts for the beneficial effects observed in various infectious diseases."

In cases of active infection, minute doses, given at two to four hour intervals, seem a rational treatment, though, as stated earlier in this paper, I start them with quarter-grain doses, at short intervals, until two to four grains have been given, following this with a saline so as to be ready to repeat the strenuous treatment next day if necessary.

Personally, I do not like to advise calomel or any cathartic, except in emergencies, but I consider the danger from its intelligent use slight as compared to the benefits derived.

With reliable and useful agents to stimulate the production of "autoantitoxins" for the prevention and cure of disease, how much greater will be our leverage, how much better armed we will be, how much the practice of medicine will be simplified, if men engaged in general and surgical work find also, as I have from time to time tried to show, that an autotoxic state is a determining factor in most of the inflammations of the body, both acute and chronic.

All the cases of laryngeal tuberculosis coming under my observation have had what I now know were marked autotoxic disturbances with each exacerbation, and these exacerbations have seemed to be the result more than the cause of their autointoxications. Sajous even contends that the development of cancer is due to hypoactivity of the body's protective mechanism.

To sum up, gentlemen—I will first ask your indulgence—as this paper is probably far from being the "last word" on the subject, but in all candor I must say that since my practice has been conducted along the lines indicated, noting carefully by the skin, eyes, tongue and breath each evidence of self-poisoning, vigorously combating this autotoxic factor and waking up the patient's vital resistance, I find my work much more simple, clear cut and satisfactory. Inflammations commonly melt away like snow under a summer sum, and the need of the knife becomes less and less frequent.

Further observations, making fifteen years that I have worked along these lines, gives me courage to state that I honestly and earnestly believe that when conditions are better studied, the medical profession will accept the fact that autointoxication is responsible for most of our human suffering, and that we have agents so efficient in controlling inflammations, by stimulating antitoxic secretions, that seventy-five per cent of the emergency operations we are now doing will be found avoidable, old age will be defered, and the practice of medicine will have to be largely rewritten.

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LXIII.

A SEQUESTRUM OF THE LABYRINTH.*

By Lester Mead Hubby, M. D.,

New York.

J. B., colored; male; aged fifty years. Had measles when eight years old without ear involvement. Married twice. No children, no miscarriages. Denies syphilis.

Fourteen years ago received scalp wound near vertex over the right ear from a blast in the subway. Noticed deafness of the right ear from that time.

Had chronic purulent otitis of the right ear for five months previous to his attack of mastoiditis.

Early in August, 1915, had furuncle of the left ala nasi, which healed quickly after being opened.

About August 9th had severe vertigo for eleven days, which disappeared two days after a radical mastoid.

During this vertigo external objects seemed to rotate to the left, and he said he staggered to the left. Was never dizzy in his life previous to this.

About August 12th there was a complete paralysis of the right facial nerve, together with an acute mastoiditis.

He was admitted to my service at the Harlem Hospital on August 18th, with an acute mastoiditis and facial paralysis of the right side. Some hearing was present in the right ear, as determined by eliminating the other ear with the Bárány noise apparatus. There was no nystagmus.

The radical mastoid operation was performed by Dr. Perry Schoonmaker, and the patient left the hospital within ten days.

No signs of fistulæ were discovered at the operation.

He reported for treatment a few times after leaving the hospital and then disappeared.

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*Presented before the New York Academy of Medicine, Section on Otology, April 14, 1916.

On January 24th, about five and one-half months after the acute mastoiditis, he was again admitted to the Harlem Hospital, complaining of some pain and a profuse discharge from the right ear.

On examination a large sequestrum was found lying nearly detached in the external auditory canal. This was removed and the discharge and granulations quickly improved.

The following tests were made: Caloric (cold), right side negative; left side positive. Rotation test to the right, nystagmus fourteen seconds; rotation to the left, nystagmus nine seconds, i. e., stage of compensation. The right cochlear nerve was nonreacting. The left was about normal and there was no reduction in the bone conduction for the C fork.

Description of the Sequestrum.—The greatest diameter of the sequestrum is seventeen millimeters and extends from a point 2.5 millimeters anterior to the canal of the first turn of the cochlea to a point in the nonampullated end of the external semicircular canal, four millimeters posterior to the vestibule.

The greatest width (ten millimeters) extends through the inner wall of the vestibule.

The following principal landmarks can be made out: The internal wall of the ampullated end of the posterior semicircular canal, the end of the nonampullated end of the external semicircular canal, the common end of the posterior and superior semicircular canals, almost the entire inner wall of the vestibule with the fovea hemielliptica and the fovea hemispherica intact, the opening of the vestibular aqueduct, the recess and part of the circumference of the round window, the floor of about two turns of the cochlea with the canal intact for three millimeters in the first turn at the anterior segment. The lamina spiralis is plainly visible in a large part of the first turn. The modiolus is intact nearly to the helicotrema. A large part of the fundus of the internal auditory canal is present, showing the openings for the cochlear and vestibular nerves. The upper internal part of the fundus where the facial nerve should enter the fallopian aqueduct is absent.

The modus operandi of labyrinthine sequestration is interesting, as pointed out by Braun, Friesner, and others.

The labyrinthine blood supply comes almost entirely from

the internal auditory artery (arteria acustica centrala Sapolini). which is one of the transverse branches of the basilar artery.

Inasmuch as there is only a slight communication with the tympanic arteries, the internal auditory is practically a terminal artery.

When, therefore, inflammation attacks this vessel near the internal auditory meatus, shutting it off, the entire labyrinth dies. This then acts as an irritant to the perilabyrinthine cancellous bone. The resulting inflammation causes granulations to form there, finally producing a separation of the labyrinth en masse.

Another interesting feature was the absence of nystagmus. This is explained by the slow destruction of the vestibular nerve, compensation proceeding step by step with the loss of function of its different parts.

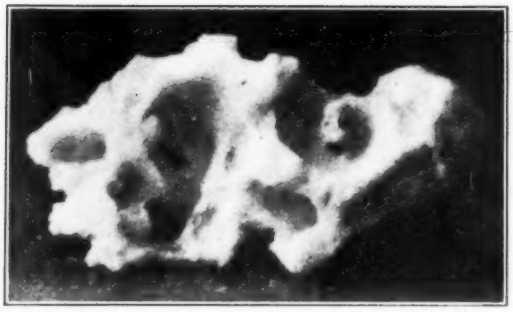

FIGURE 1.

Sequestrum of the labyrinth, external view. Magnified twenty-five diameters.

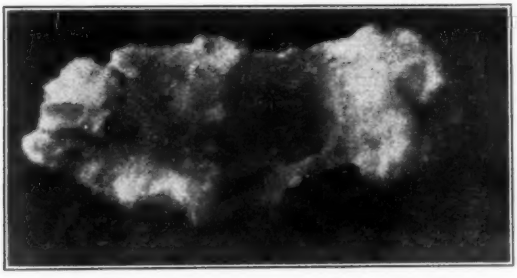

FIGURE 2.

Sequestrum of the labyrinth, internal view. Magnified twenty-five diameters.

LXIV.

ON DIAGNOSIS AND OPERATION OF SINUS THROMBOSIS.*

By J. Holinger, M. D.,

Chicago.

A number of peculiarities of sinus thrombosis will become more evident if we compare this form of general septicopyemia emanating from a well-defined focus with others of a similar kind; for example, with acute otitis media and general infection from disease of the tonsils, nose and pharynx. In acute otitis media the general malaise and fever are evidences of general infection. The focus, namely, the middle ear, inclusive of the cells of the mastoid process, is enclosed in bone, which permits the exchange of blood and lymph to take place only in a very restricted manner through narrow foramina in the bone. This explains, on the one hand, the great pain; on the other hand, the low fever, which hardly ever rises over 102° F., even in extensive suppurations in the mastoid. Embolisms or metastases do not occur.

Secondly, the conditions in general infections from diseases of the nose and tonsils differ in several respects. The parts are well supplied with blood and lymph. Therefore, when they are inflamed we see great swelling, redness and secretion. The nose and nasopharynx are much exposed to infection and apparently have free drainage to the outside. Furthermore, an extensive lymphatic system, namely, Waldeyer's ring, the follicles and the lymph vessels and glands of the neck form strong barriers against general infection. The fever, therefore, is steady but low, 99° to 101° F. Only minutest embolisms and metastases occur. They manifest themselves in rheumatic pains throughout the entire body, especially in

*Read before the Chicago Laryngological and Otological Society, May, 1916.

various joints and muscles. The infection enters the general system by way of the numerous capillaries and blood vessels from the many folds and pockets of the linings of the nose and throat. Owing to the favorable conditions of drainage of the infectious material to the outside, and also to the smallness of the vessels concerned, the invasion of the general system occurs by means of minutest particles, and often repeated. These particles are so small that they pass the capillary system of the lungs and settle in the capillaries of the joints and muscles.

Compare with these two the symptoms as we now know them in sinus thrombosis. The local pain may or may not be present, as there is no retention of secretion. Large embolisms in the lungs are frequent, and so are metastasés in the neighborhood of the joints and in the muscles. They often lead to suppurations. The most characteristic symptom is the fever. In the midst of comparative euphoria the patient suddenly becomes restless, excited, feels sick, a chill follows, and the temperature rises like a sky-rocket to 104°, 105°, or even 106° F. In a quarter of an hour, an hour, or so, the whole phenomenon may be passed. These are the typical septic attacks. They are the most characteristic symptoms of sinus thrombosis, and are produced by septic masses being thrown into the general circulation, as pieces of a septic thrombus in the sinus. The masses are retained in the lungs, if they are too large to pass, and form an embolic infarction. If they are smaller they pass the lungs and locate somewhere in the periphery of the body, or are simply overcome by the general resistance of the individual.

The comparison of these two general infections starting from a septic focus in the ear, shows, firstly, in otitis a constant small invasion of the system from a small focus. The export of the septic material from the focus is mechanically interfered with. In sinus thrombosis there is a sudden invasion of large masses of septic material directly into the blood, of short duration. This gives us important differential diagnostic points. In simple otitis there are no high temperatures and no variations; in sinus disease, high temperatures and constant variations.

Now, a sketch of the diagnosis and therapy of sinus thrombosis must be drawn, as it was given in a number of textbooks and works on mastoid surgery in the years 1906-1909 or 1910. The diagnosis was mainly based on the finding of a hard, cord-like swelling along the jugular vein, swelling of the eyelids, septic metastases in the periphery, combined with temperature and chills—all this occurring in connection with middle ear disease. Mastoid symptoms might or might not be present. Swelling and sensitiveness on several typical places in the surroundings of the mastoid, where veins leading to the sinus from outside the skull through the bone, becoming infected from the infected sinus, may indicate the trouble. Oppenheim advised, furthermore, bacteriologic blood examinations. The therapy consisted in exposing the sinus. When in doubt as to the seat of the thrombosis, puncture with the hypodermic syringe, or incision of the sinus were advised. When a thrombus was found, it was followed downward and upward until fluid blood flowed, the hemorrhage stopped by tampon, and the thrombus removed. The ligature of the jugular vein was done either before the operation or during it. This, with a few modifications, is the teaching of the following textbooks and special works on surgery of the mastoid: Whiting, 1905; Körner and Oppenheimer, 1906; Barnhill, 1907; Bing, Politzer, Hartmann, Schwartze-Grunert, Heine and Kopetzky, 1908; Dench, Politzer, Ballin, Heller, Ostmann, West-Scott (London), 1909; Lake, Gray, Urbantschitsch, 1910. Hasslauer, 1911, and Heine, 1913, have more modern standpoints. A few dissenting opinions must be mentioned. They are Bezold's textbook, 1906, and Boeninghaus, 1908, which take issue against ligation of the jugular vein. Dench could never find the cord-like band of the jugular, and objects to exploration of the sinus by puncture. A surprising statement is in Politzer's textbook, 1908, page 523. He says: "Chills, high fever, even pain along the jugular vein, do not absolutely justify the supposition of the presence of a sinus thrombosis. Even cases like the one which Prescott-Hewett[1] describes as cured, where, besides chills, metastases in the lungs and joints were also found, must not unconditionally be considered as cured cases of sinus thrombosis, since a similar complex of symptoms may occur without sinus thrombosis, through ab-

sorption of infectious material from the osteophlebitic spaces of the temporal bone." A later edition of this book does not contain this paragraph. Not less odd is the statement in Gray's textbook, saying that the author has no experience of his own about different operations on the bulb of the jugular vein.

Strong objections against these teachings are apparent at first sight. No differentiation between acute and chronic cases was made. Cord-like swelling of the jugular vein, swelling of the eyelids, could only be symptoms of very late, practically final, stages of the disease. The first one shows that the thrombophlebitis has progressed to within a few centimeters of the heart, and the swelling of the eyelids is evidence that the thrombosis has spread over a great part of the blood sinuses at the base of the brain. The objections against the modus operandi are equally strong. Koerner showed that the mortality after ligature of the jugular vein is not less than without it. A number of points may be cited which make it evident that in some cases death may be and really was due to ligature. In the first place, it certainly increases the shock of the operation; in the second, all the veins which enter the jugular from the base of the skull to the ligature, a distance of from five to eight centimeters, will become septically thrombosed; in the third, the handling of the jugular and the ligature may loosen crumbs of the thrombus, and throw them into the general circulation, the very thing we try to avoid; and, in the fourth, Nürnberg[2] cites a case of death from arrosion and rupture of the carotid artery, due to the ligature material of the jugular vein. None of these dangers or accidents can be minimized or avoided. In Scheibe's clinic, Schneider[3] wrote a paper: "Should the Jugular Vein be Ligated in Sinus Phlebitis Caused by Acute Purulent Otitis Media?" He had, without ligature, one death in thirteen operated cases, 92.03 per cent recoveries. He draws the conclusion that the ligature of the jugular vein is superfluous and worthless in almost all cases of acute suppuration. Literature shows that in many cases it has done harm. The best advice is to confine the ligature to those rare cases where the jugular vein itself is diseased.

Our operative procedures on the sinus must be influenced by the conclusions drawn by Heymann[4] in his "Experiments

on Sinus Thrombosis and Otogenous Pyemia." He says: "(1) Infectious sinus thrombosis can best be produced by laying an infected tampon against the external wall of the sinus. Simple painting or rubbing of emulsions of bacteria on the wall of the sinus, even after superficial lesions were produced, does not usually cause coagulation. Sterile compression of the sinus does not always cause coagulation. (2) Germs may enter the blood stream without the means of a thrombus. A thrombus at the place of infection is not a necessary condition for the occurrence of autogenous pyemia. (3) A sinus thrombosis usually begins as a thin parietal coagulum, which may grow to become obstructive. A large part of the blood in the sinus may coagulate so quickly that it causes the impression of coagulating all over at the same time. (3-a) The time from the infection to the coagulation varies greatly, as does the time from the first coagulation to the formation of an obstructing thrombus. (4) The thrombi may contain germs from the beginning, but may also become infected later on. The germs usually enter the thrombus through the wall, but they may also be caught from the blood current. (4-a) The number of bacteria in the thrombus varies greatly. It is usually less at the ends. A moderate number of bacteria does not interfere with organization of the thrombus. (5) A thrombus may remain adherent and nonobstructing, and become organized. (6) The growth of a thrombus usually progresses from the center. Intermittent thrombi often are produced from thrombosed veins of the dura which cause new thrombi after the first one has been absorbed. (7) Parietal thrombi have a strong tendency to spontaneous healing; even malignant thrombi heal. The infection often causes destruction of the wall; even recanalization. (8) The macroscopic appearance of the wall of the sinus does not allow conclusions as to the contents. (9) In bacteremia an aseptic thrombus becomes infected at once."

Equally important are the conclusions which Streit[5] derived in his paper, "Further Contributions to Histology and Pathology of Meningitis and Sinus Thrombosis." He says: "A thrombus usually starts from the wall of the sinus as a consequence of inflammatory changes and infection of the wall of the sinus. This first and most important cause is,

however, not sufficient. The infiltration of the wall may reach such a degree that it almost closes the sinus. Yet no thrombus will form as long as the endothelium is intact. Predisposing causes for the formation of thrombi are changes of the normal blood current, like the formation of whorls in strictures or local enlargements of the sinus."

To these experimental results we must add some observations where, after operations, thrombi formed in the previously normal sinus at places where exploratory punctures or incisions had been made, and after unintentional injuries or even after simple exposure of the normal sinus (Bondy[6]: "Sinus Thrombosis After Exposure of the Normal Sinus").

Finally, attention must be drawn to the descriptions in Bezold's textbook of large flat mastoid cells along the sinus, with extremely thin bony walls, or even dehiscences. In such cases every acute otitis media is practically an extradural abscess around the sinus.

There is no need of any further comment on these arguments. The experimenters agree that sinus thrombosis has a very great tendency toward healing, if we only succeed in keeping reinfections (perisinual accumulations of pus) away. The blood current will get rid of the thrombus, sterilize, organize and absorb it, if we only take care that the endothelium is not lacerated.

The following conclusions may be drawn: The diagnosis of sinus thrombosis is made from septic attacks. We can observe four to five attacks of chills and high temperature, in order to ascertain the diagnosis, without danger to the patient. It is not necessary to operate after the first or even after the second attack. Other sources must, of course, be excluded. The comparison at the beginning of this paper shows that in uncomplicated inflammation of the middle ear, even when the mastoid cells are extensively involved, the temperature does not rise above 102° F. As soon as we have temperatures of 104° to 105° F. in acute or chronic inflammations, we know that the inflammatory process is not confined to the middle ear. Every acute otitis media must be watched for septic attacks. It is a good plan to verify the statement of the patient about the presence of chills and high fever, either at a hospital or by a competent nurse. Other mastoid symptoms may or may not be present.

The operation consists in laying the sinus bare very extensively. Handling the vessel, palpation, incision, puncture, are to be avoided, because they are bound to cause injury to the endothelium. As a consequence, new thrombosis sets in and interferes with the organization and absorption of the old ones. Splitting the sinus and removing the thrombus till the blood flows from either end force you to tampon again and cause new thrombi. In accidental injury to the sinus, tampon lightly, so as not to interfere too much with the blood stream. Ligation of the jugular vein is reserved for very old cases with extensive metastatic abscesses.

A few cases may be mentioned briefly:

Case 1. Miss H., eighteen years old, daughter of a colleague, had acute otitis and several septic attacks. At one of my visits her mother cautioned me of an oncoming attack. The patient became very restless, complained of headache, chills developed, and the temperature went up to 104½° within seven minutes. After a few more minutes she became quiet again, and after twenty minutes everything was over. The next day Dr. Morgenthau and I operated. An abscess around the sinus was drained, but the sinus itself was left untouched. She made an uninterrupted recovery. This was ten years ago. Since then she has never had any symptoms that may be traced to sinus thrombosis.

Case 2. Ten days after the operation of a boy of six, where an extradural abscess was drained, the boy played about the room, when suddenly he stopped and cried out for pain in his right knee. The next day the knee was hot, swollen and extremely painful. Rest for a few days brought complete recovery. A septic embolism was overcome without any further disadvantage.

The enumeration of more uncomplicated cases is unnecessary.

This spring four cases were operated. Three of them showed points of special interest.

Case 3. December 29, 1915, G., girl three years old, referred by Dr. McNeill. Had a cold and suppuration from both middle ears since Thanksgiving day. During the last few days, repeated chills and temperatures up to 105½° F. set in. Mucopurulent discharge flowed from the nose and ears. The dis-

charge from the left ear was fetid. The perforation was behind the short process. Hearing: Loud conversation. All other organs were normal. Operation of both mastoids, December 31. An extradural abscess was evacuated on the right side. The sinus was exposed down to the vicinity of the bulb. On the left side some decayed bone was removed. During the first week in January several temperatures, up to 104° F., were recorded. The child left the hospital January 31. Both mastoid wounds were closed. February 29, both perforations are closed; hearing of whispered voice at more than seven meters distance.

Case 4. K., child fifteen months old, referred by Dr. Schott. Had just gone through an extensive cleft palate operation by Dr. Brophy; then pneumonia and suppuration of right ear. For the last few days she has had irregular temperatures, up to 104° F. The perforation is in the lower posterior quadrant; the region behind the ear is sensitive on pressure. An observation of several days showed that the child was getting rapidly worse. Operation June 12, 1916. The posterior wall of the antrum is formed by the sinus, which is bathed in pus. At the subsequent dressings the wound was syringed with warm boric acid solution. The temperatures kept up for another week, then gradually dropped, and the child was discharged July 3, 1916, with perforation closed, and, as far as could be ascertained, normal hearing.

Case 5. H., boy four years old. Referred by Dr. Kerlin, on account of suppuration from left middle ear, on May 27, 1916. There was also hardness of hearing, and high temperatures had been recorded. Perforation in posterior upper quadrant. The boy played all day after a few treatments. May 31 the suppuration stopped, the perforation closed and hearing became nearly normal. At 4:00 p. m. temperature was 104° F. For the next few days short periods of high temperatures showed nearly every day. No sensitiveness on pressure behind the ears. Operation, June 5, at St. Joseph's Hospital. The antrum, aditus ad antrum and a few small cells were normal. On the rear margin of the wound of the bone, on a level with the floor of the antrum, a tiny drop of yellow pus forced itself out of a pin-point opening of foramen nutritium. An extradural abscess containing a teaspoonful of pus surrounded a completely

necrotic sinus to the extent of an inch and a half. The loose necrotic parts were removed with forceps and scissors; the thrombus itself was left intact. During the next few days a few high temperatures were registered, but healthy granulations rapidly covered the necrotic area. Bacillus mucocus capsulatus was found in the pus. June 20 the boy went home. June 30 the wound healed; hearing and drum membrane normal.

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LXV.

A STUDY OF ONE HUNDRED CASES OF MASTOIDITIS AND ITS COMPLICATIONS REQUIRING OPERATION.*

By Jesse W. Downey, Jr., M. D.,

Baltimore.

A recent study of my case histories in one hundred consecutive operations for mastoiditis and its complications has been of such value to me that I trust a short review of these cases may be of some general interest. I shall give the statistics as briefly as possible and shall omit details of case history.

There were ninety-two patients in this series of cases, the youngest being ten weeks of age and the oldest seventy-five years. Forty-six per cent of the cases were in children under ten years old. The mortality was ten per cent; the complications causing deaths being as follows: Septic meningitis, three cases; cerebral abscess, two cases; cerebral tuberculosis, three cases; general septicemia (scarlet fever), one case; lobar pneumonia, one case. Two of the cases died six months or more after operation, but the mastoid wounds had never healed. In one of these cases in the service of a colleague† at another hospital, the tuberculosis of the brain was certified by autopsy. The other cases, from clinical signs, probably died from the same condition.

A few moments' consideration of the mortality in these cases is of some importance. Two of the patients died of general septic conditions, one being in the acute stage of scarlet fever at the time of operation. The other developed a lobar pneumonia one day after operation. Three of the cases were undoubtedly tubercular, one certified by autopsy; but whether

*Read before the Medical and Chirurgical Faculty of Maryland at its annual meeting, April 27, 1916.

†Dr. C. A. Clapp, Maryland General Hospital, the patient having left the clinic at the Baltimore Eye, Ear and Throat Hospital.

or not the origin of the tuberculous process was aural, it is difficult to say. I am inclined to think, however, that it was, as all three patients were negro children, two being one year of age, the third, seven years old; each had had a discharge from the ear varying from six months to three years in duration. All were apparently hopeless cases from the first.

Of the five patients who died from strictly otitic complications, but one of them had had any medical attention before serious symptoms arose. This case, I think, I shall remember as long as I practice otology, for, regardless of the most careful treatment and with the advice of two otologists of much greater experience to guide me, the patient went successively through the stages of an otitis media, mastoiditis, cerebral abscess to a most terrible death from meningitis. Three cases dying of meningitis had had discharging ears in two instances of only six weeks' duration; the other one had had an otorrhea all his short life of six years, and none of them were brought for treatment until alarming symptoms had arisen.

In the last few years most brilliant work has been done seeking to cure by drainage septic meningitis and cerebral abscesses of otitic origin. The results have been more promising in the latter than in the former class of cases, but at the best, the attempt to save these patients, once the complication has arisen, is usually futile. If, however, we compare the high death rate in the mastoid surgery of thirty-five or forty years ago, when the operation was undertaken only in the advent of grave symptoms, with the low mortality of the present day, the prevention of the more serious complications becomes evident and is obviously the result of early mastoidectomy, indicated by definite symptoms of an infection localized and confined to the mastoid process itself.

SYMPTOMATOLOGY AND DIAGNOSIS.

A discharging ear is always a menace. When of long duration, every effort should be made to cure it by appropriate and conservative treatment, but when such means fail and there are granulations in the middle ear or polyps extending into the external auditory canal, or if the patient complains of pain, headaches, vertigo and nausea, a radical mastoid operation should be advised. It is quite true that a person may have a

discharging ear for years without ill effect; it is equally true that the same person may die within a few days from an acute exacerbation with an extension of the infection to the meninges or the brain.

An acute purulent otitis media will yield quickly to treatment in at least seventy-five per cent of the cases.*

Primarily, the symptoms of acute mastoiditis are a discharging ear, tenderness on pressure over the mastoid antrum and tip, and fever. All these symptoms may be present in the very early stages of an acute infection of the middle ear, especially in children, to clear up immediately following a wide incision of the drum head and the establishment of free drainage. It is the persistence of any or all of these symptoms which is important.

Just here, for the sake of brevity, I shall make certain sweeping statements which I know are open to discussion, but which constitute safe rules to follow. First, there should be no mastoid tenderness or fever after three days of free discharge in a case of acute suppuration of the middle ear. Secondly, the case should yield quickly to treatment and the discharge should cease within ten days. The persistence of symptoms beyond this time does not necessarily indicate the need for an immediate mastoidectomy, but their continuation undoubtedly means an infection of the mastoid cells. In naming the primary symptoms of acute mastoiditis, I have purposely omitted mentioning swelling with fluctuation over the mastoid process. This is seldom an early sign, even in children, in whom it is more often seen than in adults. As it indicates a perforation of the cortex and a subperiosteal collection of pus, it rarely occurs earlier than three weeks, and usually about six weeks after the beginning of the infection.

Certain characteristics of the major symptoms are important to note. A persistent, pulsating discharge which is profuse, in spite of frequent cleansing of the external auditory canal, indicates that the mastoid antrum is involved; sagging of the posterior wall of the external auditory canal accompanying such

*One hundred and twenty-five patients were treated at the Baltimore Eye, Ear and Throat Hospital from October 1, 1914, to October 1, 1915, for acute suppurative otitis media; thirty cases were operated on for acute mastoiditis.

a discharge may be considered pathognomonic. Fever some time during the day is almost always present. Much could be written on the temperature course in these cases. I wish to emphasize but one point at this time, and that is that after the initial rise (of an acute purulent otitis media), which may be considerable, the temperature is seldom high in an uncomplicated case of mastoiditis after drainage from the middle ear is established; therefore, the temperature course must be carefully watched, and a rise to 100° F. or even 99° F. must be considered as fever, if it occurs some time during each twenty-four hours.

Tenderness over the mastoid, especially over the tip, is not uncommon in the first forty-eight hours of a severe middle ear infection, and indicates intense congestion of the bone. It should clear up rapidly after the middle ear is draining. If it persists longer than three days and becomes localized over the antrum, increasing from day to day, it takes on pathologic significance. Once middle ear drainage has become established, mastoiditis is not usually a painful condition, except in the intensely congestive forms. The patient complains chiefly of a sense of fullness in the mastoid region and of a throbbing sensation in the ear.

It is impracticable to summarize, except in a general way, diagnostic signs or the indications for operation in this series of cases. The three cardinal symptoms I have mentioned were often so well marked that the diagnosis was a very simple matter. On the other hand, there were a number of vague cases in which laboratory examinations proved of marked service. A differential count of the white blood cells was of much value in some obscure cases, increase of the polymorphonuclear cells indicating pus. Even a simple count has been of marked service. One should not expect a high leucocytosis, but a count of from ten to twelve thousand is suggestive of an involvement of the mastoid cells; and in many cases in which the count has not been above this, I have found pus in the mastoid cells. I wish to particularly emphasize the observation that the high leucocytosis of general infections will not be found in a uncomplicated mastoiditis, but the moderate increase in the number of cells should not be disregarded.

How soon after the middle ear infection may the mastoid

operation be indicated? In this series of cases I have opened the mastoid one day after earache was complained of, and without discharge from the ear, and found pus in the mastoid cells. I do not believe, however, that the history was correctly given in this case; therefore, the infection was probably of much longer duration.

I have several times in this paper called attention to marked symptoms of mastoiditis accompanying the very early stages of an acute purulent otitis media which clear up almost immediately once free drainage from the middle ear has been established. A few of these patients, however, continue to exhibit alarming symptoms for from one to three days after a free myringotomy, and the surgeon is justified in opening the mastoid, especially if there are signs of meningeal irritation; on the other hand, discretion is often the better part of valor, and if there is free drainage, a wait of from twenty-four to forty-eight hours will often show an abeyance of the fever and tenderness. If after three days the symptoms are still marked, then discretion, socalled, may become a matter of taking chances. In these very acute cases, when they come to operation, one must not expect to find quantities of pus or cellular destruction—intense congestion of the bone may be all that is present, and the operator may be surprised when he finds that the toxic symptoms often persist for several days after the mastoid process has been fully opened and is draining, and that the healing is always slow. Pathologically such cases are primarily congestive, due to nonpus forming microorganisms, and their rapid recovery depends upon the general resistance of the patient to the infection. A safe rule to remember is that the recovery must be as rapid as the symptoms have been alarming, and that the danger of complications increases as the symptoms persist, for undoubtedly this is the most dangerous type of mastoiditis. As a rule, the operation is rarely indicated under a week following an acute purulent otitis media, and the average time is from two to three weeks.

Patients with chronic discharging ears may, of course, have an acute exacerbation demanding operation at once. In my series there were eight cases of this character, with a mortality of forty-four per cent. It is a most striking example of the seriousness of chronic suppurative otitis media when it loses

its chronicity to flare into activity. In contrast, there were in the series nine patients upon whom the radical operation was performed to cure a chronic suppuration while it was yet quiescent. There were no fatal cases, and the results were satisfactory.

I wish to especially speak of the symptoms in infants and young children. Tenderness over the bone is often difficult to correctly elicit, but slight edema over the mastoid, extending above the ear, is more frequently seen than in adults, and slight enlargement of the preauricular glands and the superficial cervical glands is often present, and is a reliable indication of involvement of the mastoid cells. The temperature is usually higher and the otorrhea more marked than in adults. Also, the leucocyte count is usually higher than in adults.

I have often felt that an otorrhea continuing longer than six weeks, even though there be no other symptoms, and which is not dependent upon an inflammatory condition of the nasopharynx, is sufficient indication in children under five years of age for a simple mastoid operation or the modified radical operation. I have not, however, had the courage of my convictions sufficiently strong to urge the procedure unless there were other indications.

THE SURGICAL PROCEDURES.

The operations for mastoiditis and its complications required in this group of ninety-two patients numbered one hundred and fourteen, which may be classified as follows:

	Cases
(1) The simple mastoidectomy for acute mastoiditis	70
(2) The simple mastoidectomy for acute recurrent mastoiditis	9
(3) The secondary mastoidectomy to promote healing	8
(4) The mastoidotympanal exenteration, or the socalled radical operation, indicated by acute symptoms	8
(5) The radical operation, indicated to cure chronic suppuration	9
(6) The modified radical, or socalled Heath operation	4

(7) The ligation of the internal jugular and obliteration of the lateral sinus	5
(8) Subtemporal decompression	3
Total	116*

THE OPERATION FOR ACUTE MASTOIDITIS.

It is not the purpose of this paper to go into the operative technic. It will be sufficient to say that the simple operations consist in freely opening the mastoid process into the antrum and the removal of all necrotic bone. The anatomy of the process varies greatly, from the large cellular type to the diploetic type with dense cortex and small cells. The former type of mastoid is more often found extensively necrosed and filled with pus, even though the symptoms may have been particularly mild. The patients with dense bone formation are apt to complain of much pain on pressure, the temperature is apt to be higher, and on operation the bone is found extremely congested, bleeding at every touch, but with only a small amount of pus present. The infecting organism is, of course, responsible for the pathologic condition found. With the free pus forming bacteria, such as one of the staphylococcic groups, the destruction may be extensive with mild symptoms and rapid recovery. The cases caused by the streptococcus mucosus, for example, may show very mild symptoms and little destruction, and yet go on to serious complications. The cases following grip are apt to be extremely rapid in onset, severe and slow in healing.

The anatomic formation found on operation should be the guide as to the extent of the operation. The cellular structure should be completely opened in all cases, especially down into the tip and back over the lateral sinus. Children over two years of age, as a rule, present fully developed tip cells, and often

*Two cases had recurrent mastoiditis, and at the second operation the modified radical was done; these cases should, therefore, count as two instead of four operations. Corrected total 114. Also, as several of the operations were simply recurettements under nitrous oxid to promote healing, I have chosen to consider the series as consisting of one hundred operations.

surprisingly large mastoid processes with cells extending back into the occipital bone and forward into the zygoma.

If the dura is found exposed, or is exposed at operation, it should be let alone and no granulations adherent to it removed.

Two methods of completing the operation are in vogue. One is to clean out the bone, pack with gauze and leave the wound completely open. The other is the blood clot method devised by Blake of Boston and so ably developed by Reik of Baltimore. In this method the mastoid cells are cleaned out until all diseased portions are completely removed; the wound is allowed to fill with blood, and the skin incision is sewed up completely, with the hope that it will heal by first intention. In the first method the quickest time in which complete healing may be expected is six weeks, with a resultant depressed scar. In the second method healing is complete in one week, and there is a hair-line scar. Before speaking of these methods in detail, I wish to emphasize that my experience has been that there is no midway method—either leave the wound open or close it completely. Having had the privilege of assisting Dr. Reik and seeing his results in many of his blood clot operations, and from my own experience, I am willing to unqualifiedly say that the method is ideal, whether or not primary healing is obtained. Ideal, because it demands a painstaking operation which is of advantage, even when healing by first intention is not obtained. The opponents of the operation recount their failures and damn with faint praise their successes. We praise our successes, even when few in number, and count these few worth the numerous trials to achieve perfection. That the operation is safe, may be deduced from this fact, that whereas many have criticised, no one has yet reported a serious complication directly arising from its use.

In my series of cases I have sewed up completely in forty-five cases of acute infection. I wish it distinctly understood that these cases were all acute, and I do not include the radical operations, the modified radicals, or the recurrettements to promote healing.

In the forty-five cases that were treated by the blood clot method, I had fourteen cases, or thirty-one per cent, to heal absolutely by first intention. Ten cases broke down partially, but the healing was complete in from one to four weeks.

Twenty-one cases broke down completely and required the usual six weeks to two months of dressings before union was complete. I feel that any method which will increase my own efficiency thirty per cent and save one-third of my patients weeks of inconvenience, is a method worth all the time one may spend on it.

I have undertaken to analyze these cases, for it is out of all reason to expect healing in every case of the acute infectious nature of mastoiditis, but many of my deductions are too theoretic for publication at this time. I believe, however, that it would be possible by a careful study of certain symptoms and factors in a large number of cases to select certain cases best suited to the method. Such a study must take into consideration the duration of the disease, the infecting organism, and the general resistance of the patient. It is not the very early case that heals by first intention, but the case of from three to six weeks' duration, in which there is free pus and a breaking down of the mastoid cells.

Of the fourteen cases healing by first intention, twelve, or eighty-six per cent, had an infection of the middle ear, and probably of the mastoid cells, of over three weeks' duration; whereas, in the cases which failed to heal, seventy-one per cent were operated on in less than three weeks after the initial infection. A moment's consideration of the pathologic finding in these cases will show that this deduction is not entirely a theoretic assumption. In the early stages of a mastoid infection there is, of course, an intense congestion of the bone—the cells are not broken down, but are found filled with a serous exudate. Even after the complete removal of the cellular structure, the inner table of bone will be found markedly congested; in other words, there is as yet no line of demarcation between the healthy and the diseased tissue. Both local and general resistance is insufficiently established at this stage. In the later stage of the infection we find much less congestion, the cells are broken down, and there is an abundance of free pus, granulations and necrotic tissue, which, when cleaned away, leave a white nonbleeding inner table of bone. The general resistance has been established, and we are, therefore, much more likely to get rapid healing.

To gain rapid healing in a large percentage of cases it would be better perhaps to wait until the acute inflammatory symptoms had subsided, and I think we all are averse to operating too early, not solely on this account, but because the reaction following an early operation is apt to be more severe; on the other hand, when definite and severe symptoms of mastoid involvement appear very early, we are often forced to operate for fear of further extension and resultant complications over which we have so little control, and early drainage of the mastoid cells is by far the safer course to follow.

Concerning the secondary mastoid operation to promote healing there is little to say. Several of these were but recurettements under nitrous oxid; but as a rule the mastoid cavity was entirely reopened and cleaned of granulations and then sutured. In these cases it was almost universal to find some necrotic bone and unhealthy soft granulations. The results, as a whole, were satisfactory, and healing was hastened.

The operations for infectious recurrence present little of interest. It is not uncommon in children to have an old mastoid wound break down during a reinfection of the middle ear, even years after the first operation. The cellular structure of the bone does not reform; but it is not unusual to find a reformation of the cortex almost complete, if there has been sufficient time between the infections.

I have spoken elsewhere of the seriousness of the chronic suppurative ears. This has been most forcibly brought home to me by the high mortality in the cases upon which the radical operation was indicated by an acute exacerbation. The cases upon which the radical operation and the modified radical were performed to cure a chonic suppuration are too few in number to furnish observations of any value.

THE COMPLICATIONS OF MASTOIDITIS.

In this series of cases there were five patients who developed thrombosis of the lateral sinus. The internal jugular vein was ligated, the lateral sinus exposed, opened and obliterated. All the patients recovered. The number of cases is small, but all were of great interest, and certainly of value from the standpoint of diagnosis.

The diagnosis of the conditions is by no means as simple as the textbooks would have one believe, for the reason that the

symptoms in the early stage are seldom so severe as those described. In a case which has progressed to the stage of an organized thrombus, chills, sweats and great prostrations are often marked. When the condition has not advanced beyond a state of phlebitis, the temperature course is, as a rule, the only sign of trouble. Of course, the severity of the infection determines the rapidity of the stages between a phlebitis and a complete obstruction of the lateral sinus, but the earlier the diagnosis the greater is the patient's chance for recovery. In only one of the cases was a severe chill the initial symptom, and this man, although he was operated on within a few hours, later developed metastatic abscesses. One or two of the cases ran a septic temperature for a week before operation, and yet made perfect recoveries without complications. I believe the temperature course to be the most valuable diagnostic sign. An up and down fever course, evening rises to 101° to 102° F. or more, with morning remission to 99° F. (seldom, if ever, does the temperature drop to normal), is almost pathognomonic. There may be no chills and the patient may feel "fine," but he will take on a septic look in a day or two. Also, I most thoroughly believe in the value of laboratory findings in these cases. If a phlebitis exists the leucocytes will be increased to 18,000 to 20,000, with a relative increase in the polymorphonuclear cells. In two cases with an almost typical temperature course, I have deferred operations because the leucocyte count was normal—seven to eight thousand—to find later that in one case[1] the temperature was due to an obscure visceral luetic lesion, and in the other case to a tubercular focus in the lungs. The blood culture work of Libman and Cellar is of value, but here so much time is lost unless the cultures grow quickly that the examination is robbed of some of its value. A positive result obtained quickly is confirmatory. The ophthalmoscopic sign mentioned by Crowe some years ago has not proven of value; to be positive there must be a complete obstruction in the lateral sinus, and this is not present in early cases. That the venous obstruction may be seriously affected, however, is certain, and that this may be seen after a ligation of the in-

1. **Downey: Symptoms of Thrombosis of the Lateral Sinus. Report of a case in which an exacerbation of visceral lues simulated the symptoms of the lateral sinus thrombosis. Annals of Otology, Rhinology and Laryngology, Vol. 21, No. 4, p. 1044.**

ternal jugular has been proven in one of my cases, in whom marked choked discs developed after operation. This case[2] was reported in full by Dr. Harry Friedenwald and myself before the American Otological Society last summer. Subtemporal decompression gave immediate and permanent relief.

One case developed a cerebellar abscess, which was drained, and the child made a perfect recovery. I am indebted to Dr. Charles Bagley for this cerebellar operation and for two of the decompression operations.

Before leaving the subject of complications, I wish to say that the cases of cerebral abscesses,[3] all of which died, have been of great concern and interest to me. These cases are nearly all without symptoms of localization, and are very vague up to a point when all help is futile. There is one feature, however, that I wish to mention, and that is that persistent headache following a mastoid operation or accompanying a chronic suppurative otitis media is always a grave symptom, and should be given the deepest consideration. Some day, when we learn to diagnose cerebral abscess in an early stage, and have the courage to operate with only those signs which now seem insufficient, we are going to be able to save a creditable percentage of these patients. Headache has been the only symptom in every case I have seen, until the very last stages.

In my summing up in this series of cases, if my conclusion seems dogmatic and based on an insufficient number of patients, may I say that much has been drawn from the writings of others to be proven by these cases, and, at least, they serve as the basis for further observation and study.

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2. Friedenwald and Downey: Decompression for the Relief of Choked Disc Following Thrombosis of the Lateral Sinus. Annals of Otology, Rhinology and Laryngology, Vol. 24, No. 3, p. 613. Transactions of the American Otological Society, Vol. 13, Part 3, p. 503.

3. Two cases, not included in this paper, admitted to my service at the Baltimore Eye, Ear and Throat Hospital for observation; complained only of headache. They both had chronic suppurative otitis media. Both suddenly collapsed and died in coma before the mastoid operation was performed. Autopsy in one case, located an abscess of the temporal lobe.

LXVI.

THE UPPER RESPIRATORY MUCOUS MEMBRANE AS A KEY TO ERROR IN METABOLISM.

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Brooklyn.

The object of this paper is a plea for more rigid investigation of the primary causes of upper respiratory obstruction not due to deformities, infective processes or new growths.

The mere fact that a nose does not afford sufficient space for unobstructed breathing seems to warrant, in great plenty, for the demand that something must be removed from that organ; if not something to be removed, that it needs local treatment of some sort or another. This also applies to any of the abnormal conditions met with in the pharynx and larynx not due to local disease or deformities.

There is a long educational road and many a disheartening experience before the patient investigator who will steadfastly endeavor to make clear to the family physician and to the sufferer that general disturbances of any type whatsoever first disturb the equilibrium of the circulation and thereby place its unfailing indicator in the mucous membrane of the upper respiratory tract, as a venous stasis from peripheral nerve ending paralysis, resulting in dilatation of the peripheral blood vessels with its accompanying relaxation of the mucosa.

So striking are the ramifications of the mucous membrane index in connection with the manifold ailments of the body, so absolutely true is the pointing of the hand, it is to be regretted that it is a hidden factor for alarm to so many of our general physicians.

In this class we have to deal with more than eighty per cent of all nasal cases and, by its influence, in a great majority of inflammatory otitic, pharyngeal and laryngeal cases. In none of this eighty per cent of nasal obstruction is the removal of

any portion of the mucous membrane justifiable, unless it is found that the posterior turbinate ends are degenerated from long standing engorgement, with a resulting chronic hypertrophy or hyperplasia, of itself obstructive, or the same condition in the body of the turbinate, and then only to remove the hyperplastic bone or soft tissue with as little disturbance of the mucous membrane as possible; nor is it admissible, except in hyperplastic cases, to use the actual cautery or the various escharotics in everyday use.

Every scar or injury to the natural outline or surface of the mucosa will, in health, make its presence felt. None, absolutely none, of the everyday nasal washes or commercial nasal applications, which are numberless, are of any value whatsoever, whether used in spray, douche, snuffing, etc. The actual result is to only diminish the protective value of natural secretions in each and every case, to say nothing of acting as mechanical carriers of infective processes to surrounding areas. In other words, plainly stated, no local treatment whatsoever is indicated. The arts of medicine must be employed to meet the personal demands of the sufferer.

In actual practice, arriving at the end results by their delay, it must be admitted, is apt to be rather discouraging. The whole subject is one of detail attention to the physiologic chemistry of metabolism.

When it was above stated that the effort of this paper was to apply only to the obstructions due to noninflammatory causes, it was not meant to convey the idea that this venous obstruction was not present in the inflammatory, infective or deformed cases. On the contrary, it is rarely absent, simply causing additional obstructions and, in a great many cases, a cause for disappointment in the results of surgical procedure; such as continued hoarseness after complete healing of an operated larynx; continued suppuration and engorgement after the exenteration of an ethmoidal labyrinth; a still greater obstruction after the resection of a deviated septum or a continuance of an otitic mucous inflammation. You have your cause, without any fear of contradiction, either in some interference with metabolism, whether it is from an organic disease, an infective disease, a disease of the gastrointestinal tract, or from a parenteral anaphylaxis. There is but one word to use as the

positive starting point in any one or all of these conditions. That word is protein.

It is at present our good fortune to have in this country, as well as in foreign countries, several men, eminent physiologic chemists, who have for many years devoted themselves to a train of thought and to chemical experiments, the basis of which is the poisoning from protein or from its diverse chemical combinations. These men have shown us the process wherein the body becomes prey to itself through its inability to create an immunity to each poisonous protein derivative, each in itself producing its particular sensitization, and also how, by the absorption of the poisonous products of gastrointestinal putrefaction or fermentation, the functional destruction of the body cell or its disease change is accomplished.

They will eventually discover substances inhibitory to the activity of foreign protein poisoning by creating a field within which these poisonous products will not develop, or within which they will not be absorbed, or, if absorbed, will be immediately counteracted or destroyed.

The efforts of the writer have in the past several years been particularly and interestedly directed, in this class of conditions, toward the relief of the local symptoms due to general causes, considering particularly the end results governing only the cases of obstruction due to simple blood engorgement—i. e., infiltration from venous stasis.

It is not my purpose to go into an analysis of the various anaphylactic or toxic changes from any particular protein byproduct poisoning, whether bacterial, animal or vegetable, whether enteral or parenteral, or as to the conditions which cause the various body cells to become so loaded with these products as to become indefensible through ensuing inability to produce their various ferments for the assimilation of these protein poisons, or to be functionally destroyed by the various toxin byproducts of putrefaction or fermentation.

The physiologist tells us why when a human has yellow fever and recovers, he is then immune to the disease; but, when the sensitization from a foreign albumin has occurred, that subsequent exposures increase the susceptibility.

He has shown us how death suddenly occurs by paralysis of inhibitory nerves of the heart from absorption of toxins in great numbers.

The physiologic picture is the same in the class of cases to which I wish to call your attention, but, of course, in an attenuated degree. The same exposures, the same susceptibility, the same absorption, the same engorgement, dilatation and relaxation exemplify the simple cases of mucous membrane infiltration or turgescence, of which there are so many and by which we are so pressed and tempted to resort to surgical measures.

The physiologist has not told us how we can clinically differentiate in all cases between the action of the anaphylactic poison products and the toxic effect of the various putrefactive or fermentative changes which attack the body cells. When he discovers the exact atomic changes, then we will have our exact etiology. Let us hope the time is not far distant; but, in the meantime, let us give thanks for the far-reaching discoveries of the present.

When the rhinologist sees a nasal mucous membrane which is engorged and turgescent, relaxed, infiltrated, insufficient breathing space and, with the means at his disposal, he produces a more or less normal position by driving the blood therefrom; finds a nasal cavity which contains no malformation or new growth, no suppurative process or adjoining disease, an air space sufficient for the needs of the patient, he should know that the elimination is at fault. When the laryngologist sees the fauces, pharynx or larynx infiltrated under same conditions as above stated, he should know the elimination is at fault.

This fault of the circulation is where the mucous membrane reigns supreme as an index. Just as long as it is not normal in position, color or secretory power, just so long one may be assured that the etiologic factor is still in evidence.

From desultory reading of the investigations of the Vaughans, Rosenow, Billings, von Pirquet, Weichardt, Richet and others, and observations in many of these cases, taking into consideration what diverse etiologic factors have been discovered during treatment of these cases, I am inclined to believe that we have to deal with the combined anaphylactic and toxic influence of the protein molecule. Anaphylactic through the exposed mucous membranes or the skin; toxic through the teeth or alveolar, suppurative, inflammatory or organic lesions.

or through the gastrointestinal tract, both processes making their effect objective through the peripheral circulation.

As to whether it is a parenteral heterogenous albumin or a fermentation or putrefaction in the gastrointestinal tract, to all intents and purposes the same objective symptoms appear.

The toxic element from a gastrointestinal, fermentation or putrefaction standpoint has been the factor to which my attention has been directed more particularly. By careful inquiry into the general symptoms, methods of eating and modes of living, one can almost always find cause for disturbance of the general equilibrium. If not, the physical and chemical examination, the microscope, the X-ray, will in all probability clear up the situation.

It is not an unusual thing to have this index point the way for a diagnosis of nephritis or appendicitis, pulmonary tuberculosis or a genitourinary involvement.

A common thing for two or three quarts of cream and milk per day in a two-year-old child to claim relationship to an obstructed nose from which its neighboring mass of adenoid tissue has been removed for the relief of the mouth breathing.

In conclusion, I present the histories of three interesting cases, particularly striking in the results obtained through investigation of the general conditions, which presented in each case the same nasal symptoms from engorgement, infiltration and relaxation of the mucous membranes—retracting temporarily to normal under use of vasomotor stimulation—in which there was found no local cause for the peripheral stasis.

Case 1.—E. T. T., male, aged forty-three years; manufacturer; American. Complains of headaches and sharp pain over right temporal, malar, superior dental region and lateral right nose, continuous for past ten days. Before that every week or two for a day during past few months. Cannot sleep or eat. Frequent colds, obstructed nasal breathing, excessive nasal discharge. Has been advised to have nose operated for relief of symptoms.

On inspection, nose presents engorgement of all mucous membrane, with great relaxation. Cystic right middle turbinate. No pus. Excess mucous nasopharynx. Pharynx, fauces, larynx and tracheal mucous membrane intensely injected, engorged and edematous from capillary transudation.

All retract to nearly normal position under stimulation. Referred to physiologist for physical examination, which shows: Man five feet six inches in height; weight, 150.5 pounds. Abdomen corpulent; cyanosis of extremities. Anxious expression to face—peripheral vessels show no arteriosclerosis. Capillaries chronically dilated about face, neck, upper abdomen and lower chest.

The larger nerve trunks are tender to pressure. The reflexes are moderately exaggerated, especially the knee jerk; the skin shows marked demography, no eruption. There is no lymphatic glandular enlargement; no edema of extremities. The tongue is coated throughout heavy white. The saliva is strongly acid to litmus. The lungs show no abnormality.

The heart, trifle hypertrophied, dullness just outside the upper line and in fifth space. There is a soft blowing systolic murmur at apex and transmitted to left as far as axillary line. The first sound at aortic area is impure, the second aortic is not accentuated.

Abdomen shows decided tympany over whole of colon and small intestine, stomach dilated to below umbilicus.

Tenderness over right temporal, malar and nasal regions.

Ophthalmoscopic examination shows overfilled veins and stasis in capillaries.

Urinalysis: Total thirty-two ounces, acid, 1022, no albumin, no sugar, no casts, marked indican.

Blood shows hemoglobin 90 per cent; leucocytes, 7000. Blood pressure: Systolic, 100; diastolic, 70 hgm.

This case was a typical example of gastrointestinal toxemia. Appropriate attention to the intake and output cleared up the whole situation unusually early. The trifacial irritation was especially aggravating, but was the symptom which cleared up earliest. The upper respiratory mucous membrane retracted and maintained normal position and function.

Case 2.—F. B., male, aged fifty-seven years; American; married; employed in general postoffice. Complains of hoarseness two months. Has been able to only whisper at times. Nasal breathing space decidedly lessened. Good deal of secretion from nose and throat. Family and personal history negative.

Examination: Nose: Considerable venous stasis and relaxation. Some clear mucus on floor posteriorly. Pharynx and fauces more relaxed than engorged. Larynx: Rima and arytenoids congested; false cord infiltration, considerably more in right than in left. Vocal cords greatly engorged, juicy and irregular in outline. On phonation, right cord moves past center posteriorly; absolutely no movement of left cord, which remains in cadaveric position.

Decided to have chest X-rayed and general condition investigated.

Physical examination shows patient anemic, pulsating brachial arteries. Small vessels show stasis, especially upon abdomen and lower chest. Hands are cyanotic and cool. No general lymph gland enlargement. Reflexes, knee and arm, are increased.

Skin is poorly nourished, but shows no edema or eruption. Demography is marked.

Lungs show good respiratory murmur over whole chest.

Heart slightly hypertrophied; no murmurs are heard at apex or base. Second aortic sound is greatly accentuated. The dullness across the base of great vessels is increased to the amount of three centimeters. There is a lack of muscular sound to the first sound at apex.

Abdomen tympanitic, especially stomach and small intestines. No masses palpable. Liver of normal size, but tender. Spleen negative. Stomach is distended with gas; extends to umbilicus.

Tongue is coated and larger than normal; shows indentation of teeth.

Peripheral nerve trunks tender to palpation.

X-ray shows enlargement of tracheobronchial group of lymphatic glands with calcareous degeneration of some of the bronchial group.

Urinalysis: Acid, forty ounces total in twenty-four hours, ten grains urea to ounce; no albumin, no sugar, no casts; indican increased.

Phenosulphonaphthalin test, first hour 32.5 per cent, second hour 27.5 per cent, third hour 10.0 per cent.

Weight 194 pounds formerly, now 184 pounds.

Blood examination: Hemoglobin, 85 per cent; leucocytes, 8400.

Blood pressure: February 23, 1914, systolic, 190; diastolic, 140. September 17, 1914, systolic, 152; diastolic, 90.

In the case of F. B., the main complaint was the hoarseness. No local treatment was advised. Attention to the cardiovascular and gastrointestinal changes cleared up the laryngeal lesion absolutely in about six months. At present the vocal cords are acting normally, the mucous membranes of upper respiratory tract in normal position, and the general condition of the patient is vastly improved.

Case 3.—Mr. H. V. T., aged thirty-three years; American; married; flour broker. Complains of being down in general condition for past six months—inability to breathe through nose and hacking cough. Has lost fifteen pounds in past nine months. Good deal of secretion from nose and throat. Eight years ago had congestion of left lung. Family and personal history otherwise negative.

On examination nose presents great venous stasis; mucous membrane blue, engorged and macerated; mucopus from left infundibulum. Retracts to nearly normal position under adrenalin. Slight anterior convexity of cartilaginous septum. Pharynx presents small nodules of lymphoid, no obstruction. Moderate drip posterior choanæ. Fauces moderately engorged. Larynx—false cords and rima greatly engorged and reddened. Vocal cords hyperemic and edges roughened; parallel on phonation. Posterior wall somewhat thickened, but not characteristic of tuberculosis.

Advised to have sputum examined and general condition investigated.

Physical examination shows man well nourished, venous stasis throughout body; likewise capillary. Peripheral blood vessels show no connective tissue change or muscular spasm. There is a general glandular enlargement of anterior and posterior cervical chain, axillary and inguinal.

The skin shows no eruption, but gives a good reaction in form of demography.

The tongue is heavily coated, especially the posterior one-third.

The chest shows incomplete consolidation of whole left upper lobe and moderate infiltration of the apex of left lower, especially posteriorly. The remainder of chest is negative.

Heart dullness not increased; sounds weak at apex and base; decided lack of muscular tone to first sound. No murmur heard.

Abdomen corpulent, tympanitic throughout.

Liver trifle enlarged and very tender to palpation. Spleen not felt.

Temperature, 99.4° F.; pulse, 120; respiration, 18.

Urinalysis: Acid, 1020; no albumin, no sugar, no casts; indican moderate.

Blood shows hemoglobin, 88 per cent; leucocytes, 10,000.

Blood pressure: Systolic, 118; diastolic, 90.

Von Pirquet reaction for tuberculosis positive. Sputum shows tubercle bacilli.

In this case the attention of the patient was centered upon the nasal obstruction and cough secondarily. As above findings show, case was of bacterial toxemia.

No local treatment was advised, but the general pulmonary lesion was at once attacked, with resulting healing. Four years later the patient was in fine condition, with none of the original venous stasis of the upper respiratory mucosa.

LXVII.

TWO MAXILLARY SINUSES IN ONE MAXILLA.

BY

O. H. HORRALL, A. B., AND H. F. RAWLINGS, M. D.,

CHICAGO.

This anomaly was found in the left maxilla of a white man of about fifty years of age. In this left maxilla we found two sinuses, an anterior and a posterior, separated by a complete osseous septum. The sinus in the right maxilla is normal, with a capacity of 2.4 centimeters.

The septum which separates the two sinuses is in the frontal plane above the middle of the third molar tooth. It is about 0.25 millimeter in thickness, thirty-one millimeters vertical measurement and sixteen millimeters mediolateral measurement. It is smooth and covered by mucous membrane on both sides. The more anterior of these two sinuses represents the normal sinus maxillaris (antrum of Highmore). It communicates by means of the infundibulum ethmoidale with the middle meatus. The frontal sinus, which is rather large, extending in the orbital bones two-thirds of the way over the orbital cavity, open normally into the anterior part of the infundibulum ethmoidale. Three anterior ethmoidal cells open by separate ostia into the upper part of the infundibulum. The anterior maxillary sinus has no pockets and no accessory ostium. The capacity of this sinus is 7 centimeters; greatest vertical extent, 34 millimeters; greatest mediolateral extent, 24 millimeters; greatest anteroposterior extent, 24 millimeters. The opening of the sinus is elliptical; the greater diameter, anteroposterior, 5 millimeters; the lesser, vertical, 3.5 millimeters.

The posterior sinus communicates by means of a single ostium with a small but distinct cell. This small cell, which is obviously a posterior ethmoidal cell, communicates with the inferior posterior part of the superior meatus by means of an ostium which is 12 millimeters anteroposteriorly by 3 millimeters vertically. The ostium between the posterior sinus and

this cell is 3.2 millimeters anteroposteriorly by 7.4 millimeters vertically. The capacity of the posterior sinus is 4.35 centimeters; greatest vertical extent, 33.5 millimeters; greatest mediolateral extent, 16 millimeters; greatest anteroposterior extent, 22 millimeters. This posterior sinus has three distinct pockets, one in the superior anterior part, one in the superior posterior part, and a third in the inferior posterior part. Each of the two superior pockets is formed by a partial osseous septum projecting downward from the superior surface, while the inferior pocket is formed by a septum rising from the floor of the cavity. These incomplete semilunar septa project into the cavity not more than five millimeters.

The abnormal posterior sinus is clearly an aberrant posterior ethmoidal cell, which has invaded the body of the maxilla and there developed extensively.

All measurements were made with the mucous membrane, which lines the sinuses, intact.

The specimen is preserved in the anatomic museum of the University of Chicago.

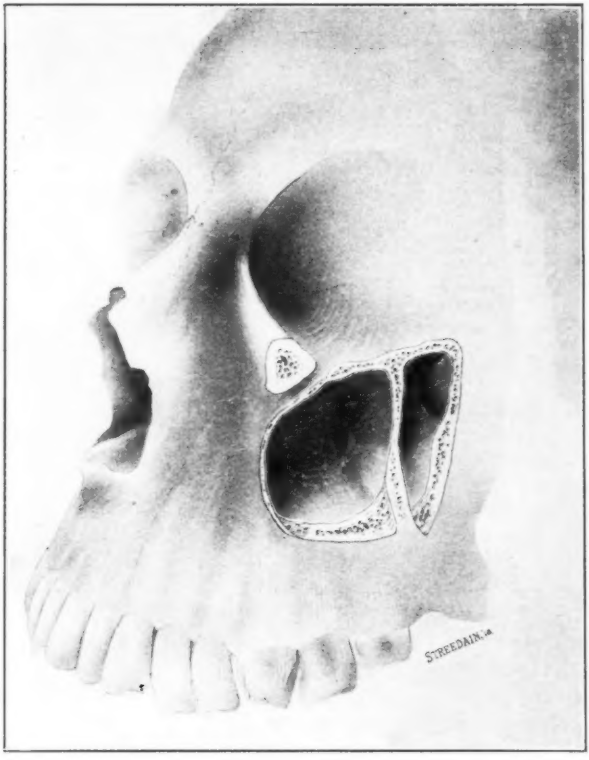

FIGURE 1.

Left maxilla, showing the two sinuses described in the text, and the partition separating them.

LXVIII.

THE ADVANTAGES OF THE DENKER OVER OTHER OPERATIONS ON THE MAXILLARY ANTRUM, WITH A REVIEW OF TWENTY-ONE CASES AFTER THIS METHOD.

By W. Likely Simpson, M. D.,

Memphis.

There is, of course, not such a thing as any one operation being perfect for operating on all chronic suppurating antrums, but the Denker operation has, it seems to me, more to recommend it than any other operative procedure which has been suggested up to this time. I shall not compare this operation with those procedures in which a temporary opening is made in the inferior meatus, middle meatus or both for the relief of acute suppuration in antrums without polypi, necrosis of bone, etc.—in other words, in antrums with only a moderate pathologic process. It is the opinion of some that in antrums with only moderate pathologic changes, washing the cavity through the inferior meatus will cure the great majority of these cases without any operation.

If an operation is to be recommended for relief of chronic antrum suppuration, it should be a procedure with the following advantages:

1. It should give as a final result a normal functionating nose without a tendency of antrum suppuration to relapse.

2. It should allow the operator to be thorough in the removal of all polypi, necrotic bone, etc. All parts of the antrum should be opened to direct inspection.

3. It should leave the nasal cavity as near as possible in a normal condition. The turbinates should not be sacrificed, and too large an opening should not be left between the antrum and the nose cavity, so that an atrophic condition would be set up.

4. It should have a healing period reasonably short and without any considerable pain or discomfort.

5. It should have few or no complications, as fistulas into the mouth, lacrimal obstruction, etc.

The advantages of the Denker operation over other procedures recommended for relief of extensive pathologic changes in the antrum can probably be best shown by comparison with each individual operation.

The alveolar or Cowper operation has, it seems to me, nothing to recommend it. If an antrum suppuration is caused by a bad tooth and is acute or subacute, all that is needed is treatment of the tooth by a dentist and washing of the antrum through the inferior meatus by the rhinologist. If the antrum is a chronic one, then the removal or treatment of the offending tooth with a Denker operation on the antrum would be indicated. If a large opening into the antrum is made through the tooth socket, the after-treatment is long, probably a lifetime; the antrum probably becomes infected from the mouth cavity, and often it is necessary to insert a tube from the antrum draining into the mouth. To have a constant drainage of mucopurlent discharge into the mouth is very annoying to the patient, while a Denker operation, after the proper care of teeth, would bring about a cure in a very short time. In the Cowper operation the contents of the antrum cannot be inspected thoroughly, polypi and diseased bone cannot be removed thoroughly, as in the Denker operation.

The Küster operation, which consist in making a large opening into the antrum through the canine fossa, and clearing out granulations, polypi, etc., without making an opening into the nose and carrying out the after-treatments through the opening in the mouth, is not to be recommended. The only thing which the operation has to recommend it is that it allows inspection of the greater part of the antrum cavity. The Denker gives much better inspection, closes the opening into the mouth at once, gives perfect drainage into the nose, and the after-treatment is much shorter.

The points of advantage of the Denker over the Luc-Caldwell are as follows:

1. The opening into the antrum from the nose is farther forward in the Denker, making the after-treatment easier; especially is this so if the patient is to wash the antrum with a tube.

2. The anterior angle can only be reached through an operation which removes the bone from pyriform aperture posteriorly, opening the anterior angle. This is not done in the Luc-Caldwell operation. The inferior turbinate, if normal, is left intact in the Denker, while in the Luc-Caldwell the anterior part is usually removed; therefore, in this respect the Denker would be much preferred. The mucous membrane in the nasoantral wall in the Denker, which is laid on the floor of the antrum, encouarges a final good result, and therefore shortens the time of healing very much. This flap also prevents the piling up of granulations at the base of the bony nasoantral wall, which is very liable to occur in the Luc-Caldwell.

The Denker operation has all the advantages of the Luc-Caldwell, with the other advantages first mentioned.

The only disadvantage which I have seen from the Denker operation is that the nerve filaments to the central incisors and canine teeth are cut, causing a numbness in these teeth; but it has been my experience to see these symptoms gradually become less marked and finally not noticed by the patient.

The Canfield or Canfield-Ballenger operation has some of the advantages of the Denker, but certainly an intranasal operation on an antrum filled with polypi, etc., is not as satisfactory as the Denker, where direct inspection through a good-sized opening can be obtained. The Skillern operation is very similar to the Canfield, but is less radical, and really cannot be recommended for chronic suppuration.

The intranasal opening of the antrum as suggested by Myles, the operation of Krause, removal of anterior part of the middle turbinate and making quite a large opening into the antrum, also making a large opening into the antrum with saws after the removal of the anterior part of the inferior turbinate, as suggested by Vail; the opening into the antrum with chisels, as suggested by Stein, Corwin, etc.; trephining of nasoantral wall by Bishop, and rasping of same by Wells, and cutting away of wall with Ostrom's forward cutting forceps, the breaking down of a larger part of nasoantral wall, with retention of inferior turbinate, as suggested by Sluder; the saving of inferior turbinate, as suggested by Hirsch, with a large opening inferior to the turbinate; the operation of Rethi, in which a

large opening into the antrum through both inferior and middle meatus, and Roe's opening of nasoantral wall with forceps, and the operation of Freer, etc., are all good for mild cases, but if the antrum is filled with polypi, the bony walls are necrotic, or cysts are contained in the antrum, then only a more radical operation is indicated, and I believe the Denker is to be preferred.

It has been said that there is too much shock to the external operation, and that it is necessary to operate with a general anesthetic, but I do not find that either of the statements hold true. The Denker can be done with very little discomfort with cocain and novocain and without shock. As a rule, I do not find it necessary to use a general anesthetic. There is no more necessity for a general anesthetic for the Denker operation than there is in removing a crooked bony septum of the nose.

It seems to me that the advantages of the Denker operation should again be mentioned:

1. It gives a good view of the interior of the antrum—better than can be obtained through an intranasal operation.

2. It gives a large opening at the anterior angle of the antrum, which is not obtained by any other external operation.

3. It gives a large mucous membrane flap, which materially shortens the after-treatment and prevents granulations from closing the opening from below.

4. It leaves a normal functionating turbinate and nasal cavity, usually healing from three to four weeks.

REVIEW OF CASES.

In reviewing the twenty-one operations, I shall discuss them briefly from the following viewpoints:

1. Anesthesia used.

2. Whether the antrum suppuration was complicated by other sinus troubles, diseased teeth, cysts, etc.

3. If other sinus troubles were present, was an operation done on this sinus at the same sitting, or previously, or afterwards?

4. Whether previously an operation had been done on the antrum.

5. Whether the wound in the mouth was entirely closed with sutures at the time of the operation.

6. If complications, what they were.
7. The final result.

1. As to Anesthesia.—In twenty-one operations, cocain and novocain was used in twenty cases, and ether in one. One per cent novocain was injected over the anterior surface of the antrum under the periosteum, after applying a small amount of cocain to the mucous membrane. I usually apply cocain with an applicator to the nasoantral wall and inferior turbinate. A solution of novocain and adrenalin is applied to the antrum cavity during the operation. If one is operating on a child or nervous woman, it would probably be best to use a general anesthetic, ether preferred. I used morphin, one-quarter grain, about one hour previous to the operation in my former cases, but of late have discarded it and do not see any difference in the discomfort.

2. Complications of the Antrum Disease by Suppuration in Other Sinuses, Cysts, etc.—Only two of these cases were complicated by frontal sinus suppuration, and ten of the operations were complicated by ethmoid suppuration. One case had a sphenoid suppuration. None of the cases was complicated by cysts, bad teeth or bony septum in the antrum.

3. If Other Sinuses Were Affected, Was an Operation Done on the Other Sinuses at the Same Sitting as the Denker Operation, or before or after?—In only one case was the middle turbinate removed and ethmoid curetted at the same sitting of the Denker operation. In ten cases the middle turbinate was removed and ethmoids were curetted previously to the Denker, and in one case the sphenoid was opened previously to the Denker. In two cases an intranasal frontal sinus opening was made after the Denker.

4. As to Whether a Previous Operation had been Done on the Antrum.—In no case was an operation done on the antrum previously.

5. As to Closure of Mouth Wound.—In ten cases the antrum was packed rather tightly; also on top of the nasoantral flap, and the end of the packing left hanging into the mouth through the mouth wound, and in two to three days the packing was withdrawn through the mouth and then two or three sutures inserted. This procedure is supposed to disturb the flap of the antrum less than if the packing is removed through the nose.

In the last eleven cases very little packing has been used and the mouth wound has been entirely closed, getting primary union, doing away with any danger of fistula in the mouth. Very little packing is necessary.

6. As to Complications.—In one case in an old gentleman, with a double Denker operation, erysipelas set in on the fourth day. The healing went along nicely, except that the lip was so swollen that sutures could not be placed in the mouth wound after the packing was removed and, therefore, fistulas in the mouth on both sides was the result. These fistulas, after some difficulty, were closed.

In one case a man with very filthy mouth and filthy habits, a small abscess of the soft part anterior to antrum was the result. After a few days this pus cavity was evacuated and he made a good recovery.

7. The Final Result.—I have followed seventeen of these cases and in each one there has been a good result. There has not been a relapse in one case. In one case, in which part of the inferior turbinate was removed, there is slight crusting, but the patient also has some ethmoid trouble which would account for that. In the cases without other complicating sinuses, the nose is perfectly normal and I feel that I am justified in being enthusiastic about the Denker operation.

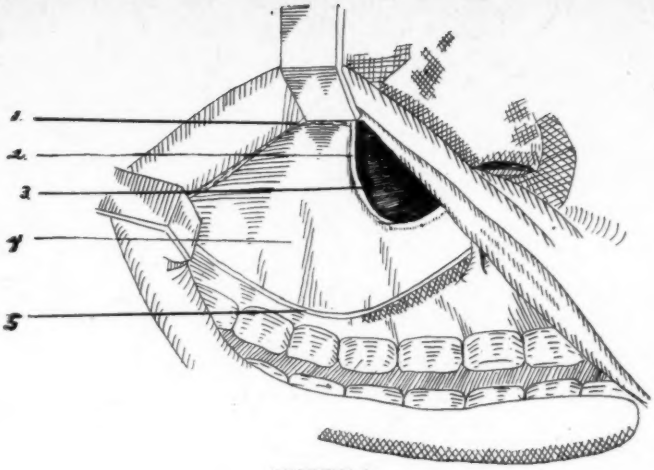

FIGURE 1.

First step in the Denker operation. The soft parts incised and retracted.

1—Lip and soft parts from the anterior wall of antrum, etc., retracted upward.
2—Apertura pyraformis.
3—Nasal mucous membrane.
4—Bony anterior antral wall.
5—The lower border of the incision.

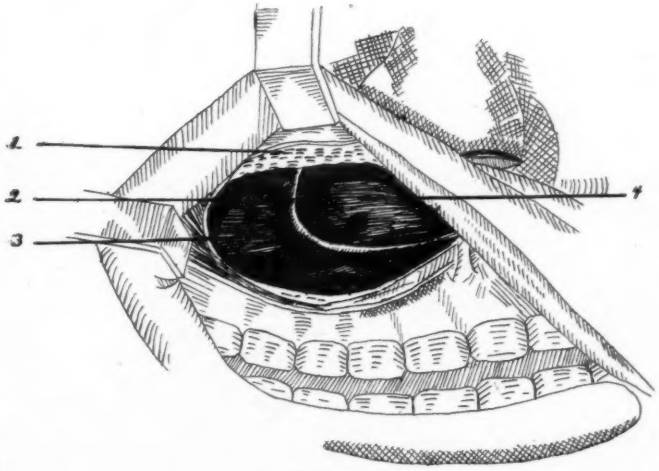

FIGURE 2.

Second step in the Denker operation.

1—The superior border of the removed bony anterior wall.
2—The border of the partially removed bony nasoantral wall.
3—The maxillary antrum.
4—The mucous membrane of the nasoantral wall.

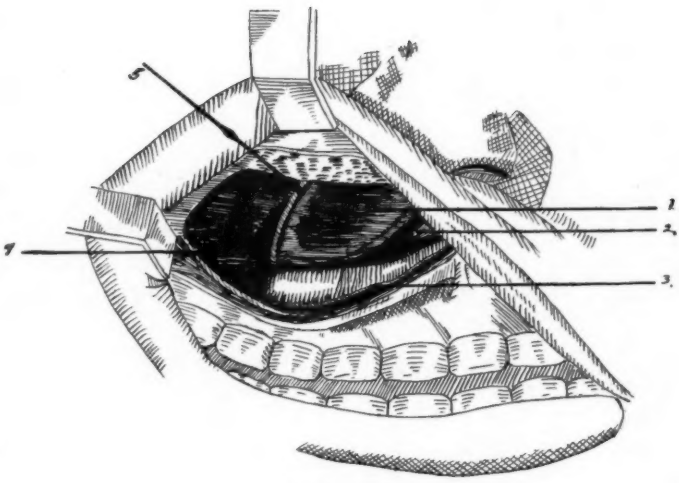

FIGURE 3.

Third step in the Denker operation.

1—The inferior turbinate body.
2—Space between the inferior turbinate and the flap opening into the nasal cavity.
3—The flap of mucous membrane from the nasoantral wall lying on the floor of the antrum.
4—The maxillary antrum.
5—The posterior border of the partially removed bony nasoantral wall.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of April 14, 1916.

Scalp Infection Simulating Mastoiditis.

DR. J. MORISETTE SMITH: The patient, J. M., aged thirteen years, had otitis media purulenta acuta three weeks ago. A myringotomy was followed by a discharge which ceased in three or four days.

Three days ago a swelling was noted behind the right ear.

Examination showed a swelling over the mastoid tip resembling a Bezold perforation, with tenderness over the tip and behind in the region of the emissary vein. Dry drum membrane, bulging in upper posterior quadrant. No glands palpable; no evidence of furunculosis; nose and throat negative; no temperature.

The treatment consisted of rest in bed, cathartic, incision of drum membrane, boric irrigations.

X-ray plates, taken by Dr. George S. Dixon, showed diffuse cloudiness on right side.

The aural discharge stopped in two or three days, the swelling behind the ear disappeared, with some glands palpable. It was evidently a postauricular adenitis with an obscure focus of infection—probably the scalp.

DISCUSSION.

DR. HAYS said that when the girl's ear drum was opened up, before she was seen by Dr. Smith, there was only a slight discharge, and it cleared up nicely. On his return, there was apparently a mastoiditis, and the tip was tender; this condition was corroborated by the X-ray plate. The chief point of interest in the case was the conclusion that one must not put too

much confidence in the interpretation of the X-ray picture in such cases without clinical confirmation. In this instance the X-ray findings were clear, and yet the cloudiness was due to a swelling over the mastoid. The best evidence that it was not a mastoid condition was that it cleared up in a short time after the patient's scalp was attended to. The glands subsided, and she has had no further trouble.

A Case of Acute Mastoiditis With Glycosuria. Mastoidectomy Under Novacain, Followed by Hyperpyrexia, the Latter Falling Synchronously With the Disappearance of the Glycosuria.

DR. LESTER MEAD HUBBY: S. M., male, aged thirty-six years. Had variola in infancy; otherwise no serious illness. No history of previous ear disease.

Nine days prior to admission had an attack of influenza. Six days later otalgia began. Within twelve hours otorrhea set in. Two and a half days later patient came to Dr. Phillips' clinic at the Manhattan Eye, Ear and Throat Hospital.

There was a profuse otorrhea, some narrowing of the external auditory canal near the annulus, marked tenderness over the lower half of the mastoid process, considerable pain near the mastoid, marked general prostration.

He was admitted for operation on the following day, with the following status: Temperature, 99.4° F.; pulse, 100; respiration, 26. Urine contained sugar, acetone, diacetic acid, albumin and casts. General condition poor.

Operation under local anesthesia was, therefore, deemed advisable. A hypodermic of morphin, one-fourth grain, was given half an hour before the operation.

Novocain, one-half per cent, was used intra- and hypodermatically, also hypoperiosteally, over the mastoid process and the posterior meatal wall of the external auditory canal. Novocain ten per cent was swabbed occasionally in the wound whenever there was evidence of slight pain. Practically no pain was produced except at the end of the operation, on biting off with a rongeur a rough edge of bone near the surface on the posterior edge, when a severe twinge occurred.

A very large mastoid was found filled with pus, and the dividing walls of the cells were partly necrosed. On culture the offending organism, taken from the mastoid wound at the time

of the operation, was found to be the streptococcus hemolyticus.

The patient seemed to be none the worse after the operation, yet in three hours his temperature rose from 100° to 104° F., and remained around that point for about seventy-two hours.

During that period of seventy-two hours the following conditions prevailed: The urine contained sugar 3.3 to 3.5 per cent; acetone and diacetic acid were present; albumin .2 grains per liter; hylin and fine granular casts; some pus cells. Severe cephalalgia, especially in the vertex; at times a severely burning sensation there. Morphin occasionally and ice bag continuously were used for its relief. Very little nourishment taken.

The wound was rather loosely packed with iodoform gauze, so that there was considerable oozing of blood during the first forty-eight hours.

There was considerable cellulitis and tenderness below the mastoid at the end of this period.

The dressing was removed, the wound packed with sterile gauze, and a continuously wet dressing applied at noon April 27th—i. e., a day and a half after the operation.

No symptoms referable to the thoracic or abdominal organs were elicited by repeated examinations, except the urine findings.

There was no cough, no thoracic pain, no alteration of the pulse or respiration ratio.

Blood culture, taken on the 27th, was negative after thirty-six and ninety-six hours. (Dwyer.)

Leucocyte and differential count on the 27th was as follows: Leucocytes, 16,000; large mononuclear lymphocytes, three per cent; small mononuclear lymphocytes, 10 per cent; polynuclear neutrophiles, 87 per cent.

On the evening of the 28th, seventy-two hours after the operation, the temperature started to fall by lysis; the sugar, acetone and diacetic acid disappeared from the urine on the following day, and the patient gradually returned to a normal condition.

He left the hospital on the fourteenth day with a normal temperature. He returned every other day for change of dressings.

The mastoid wound healed very slowly. Near the tip the wound closed and opened many times for about six months.

Since leaving the hospital the urine has been examined periodically, and only twice at long intervals has there been a very slight trace of sugar.

The puzzling feature of this case is the postoperative temperature. Aside from the temperature curve there were no symptoms of pneumonia. Unfortunately, the X-ray was not being used at that time to demonstrate hidden pneumonias.

Absorption of fibrin and other ferments from a wound some-

URINALYSES.

April	27th	28th	29th	30th	May 1st	2nd
Spec. grav.	1028	1032	1020	1022	1024	1010
Reaction	Acid	Acid	Acid	Acid	Acid	Acid
Albumin per litre	.2 gms.	.2 gms.	.2 gms.	Trace	Trace	.1 gm.
Sugar	3.5%	3.3%	Neg.	Neg.	Neg.	Neg.
Bile	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Blood	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Urea (gms. per liter)	16	18	16	14	18	....
Indican	Trace	....	Trace	Sl. trace	Trace	Sl. trace
Casts	Hyaline Fine gr.	....	Trace	Sl. trace	Trace	Sl. trace
Blood cells	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Pus	Some	Some	Some	Some	Mod'rate	Some
Crystals	Uric ac. Calc. ox.	Some	Some	Some	Calc. ox.	Calc. ox. Uric ac.
Bacteria	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Acetone	Present	Neg.	Neg.	Neg.	Neg.	Neg.
Diacetic acid	Present	Neg.	Neg.	Neg.	Neg.	Neg.
Amount 24 hrs.	.....	750 cc.	.....	750 cc.	450 cc.	620 cc.

times causes a high temperature, but the temperature in this instance continued after the disappearance of the hemorrhagic discharge.

The cellulitis in the neck would hardly produce such an even temperature curve.

The disappearance of the sugar at the moment of the lysis of the temperature curve was also interesting; whether this was due to the starvation of the first day or two, followed by a diabetic regime, or directly to the disappearance of the cause of the sugar excretion, it is difficult to say.

The sugar excretion in diabetics is liable to be increased by anxiety or shock, and it is to be noted that this patient has a very neurotic diathesis.

This may, therefore, explain the glycosuria at the time of this illness.

The examinations on May 3rd, 4th, 7th and 9th were about the same as those of May 2nd, except that the amount of urine excreted steadily increased.

There was no discussion of the case, but Dr. Hubby expressed his regret that he had not taken an X-ray of the chest in order to absolutely rule out pneumonia. Excepting the temperature curve, there was no symptom of pneumonia.

Paper: Extensive Keloid of Mastoid Wound Cicatrix.*

By Frank L. Ryerson, M. D.

DISCUSSION.

Dr. Graef said that it was an exceedingly interesting case. He had seen something like it on the lobule of the ear, from wearing ear rings. Some years ago, in London, he saw some interesting keloids in the clinic of Jonathan Hutchinson, who said they often came from flogging in the old days, and showed two cases. It would seem that these patients have a peculiar excitability of the skin, as there is nothing malignant about the growths. Perhaps Dr. Ryerson could make an experimental cut or two somewhere on the body and see if keloid scars developed, or if, perhaps, the long continued suppuration was a factor in this particular location.

Dr. Hubby said that three years ago he had presented a case of keloid of the auricle which had been removed twice and recurred. He removed it on the second occasion, and then, as it began to recur, turned the patient over to Dr. Law, who treated it with the X-ray for six months and stopped the growth. Dr Hubby said he did not remember how often the treatment was administered, nor the dosage, but the condition had not recurred. He had seen the patient about two months ago.

*See page 947.

Dr. Leshure said that he had had a case something like this one, occurring in a mastoid wound; it was like this one in that it followed a long continued suppuration. He asked if Dr. Ryerson had tried the high frequency current; that is sometimes beneficial.

Dr. Paule Bechet said that the cause of keloid was not known, and that while spontaneous keloid arising from an absolutely unbroken surface was mentioned in textbooks, it was his opinion that it invariably followed some break of the skin surface, no matter how slight. He had frequently seen keloid follow the attempts of patients to express comedones on the chest. The lesion in Dr. Ryerson's case was typical keloid, and bore no clinical resemblance whatever to sarcoma. It might be of interest to mention that the main point of differentiation between keloid and hypertrophic scar was that the former always extended beyond the limits of the original trauma. The treatment of this condition was disappointing; of all the therapeutic agents, the X-ray gave the best results. It should, however, be given in measured doses and pushed to the point of erythema. The massive dose method was particularly applicable. The old-fashioned fractional dose method with unmeasured rays was practically useless. With X-ray treatment the tumor flattened, lost its hardness, and in favorable cases disappeared, leaving a soft, smooth scar, but unfortunately was frequently complicated with telangiectasia, a condition which frequently follows the use of the X-rays. Internal treatment with arsenic, etc., was useless. Fibrolysin had been tried, and had not given any remarkable results. A ten per cent solution of thiosinamin, in equal parts of glycerin and water, or in alcohol, of which ten to twenty minims are injected into the growth, has, according to the reports, given excellent results. Excision is not advisable, as recurrence almost invariably takes place. Where the growth has been very small, electrolysis has been very successful.

Dr. Ryerson, closing the discussion, said that as yet no histologic examination had been made, but he would have this done later on. He wished the section to see the patient before anything was attempted for his relief. The man had a number of scars on his fingers, but none on his body. The high frequency current has not been applied.

Dr. Ryerson said Dr. Bechet seemed to think he had the idea that keloids could occur spontaneously, but he had not meant to convey that impression. It may have its origin from a scratch which has been forgotten.

Report of a Case of Mastoiditis Complicated by Suppurative Arthritis of the Shoulder. No Sinus Involvement.

Dr. James P. Erskine (by invitation) said that the main points in the history were the development of a mastoiditis following influenza. The patient had been confined to bed for a week, and then after having had earache for a day and a half he examined the ear and found a bulging drum with a hemorrhagic bullæ on the membrane. The drum was incised and drained. He saw the patient at the end of a week, and he seemed to be better for five days, and then for two days again suffered with earache. His physician said his characteristic pulse was 64. Five days after the incision he had more pain, enough to keep him awake at night, and he was not a man who was given to make undue complaint. A culture showed streptococcus brevis. There was then some tenderness over the mastoid, so it was recommended that the mastoid be opened. The temperature at that time was 100° F.; it did not go above 101° F. The family hesitated for three days about having the operation performed; but finally, ten days after the earache, the mastoid was opened. On that afternoon there was a sudden rise of temperature to 103° F.; previous to that it had not been above 101° F. There was nothing unusual about the mastoid operation. The mastoid was large. The man was large, was over six feet tall, and weighed one hundred and forty-seven pounds. He was below par; an intimate friend said that he had been drinking a good deal and eating very little. There was free pus. The cells were extensive. The dura was exposed for a small area—about one by one-half centimeter.

On coming out of the anesthetic the man complained of pain in the shoulder of the opposite side. Dr. Erskine said that he had followed the man down to the ward from the operating room, and was confident that there was no roughness in handling him; but he declared that his shoulder felt as if it were dislocated. There was tenderness over the front of the

shoulder, and the movements were painful. The next day it showed redness, and three days later, when the joint was opened, the arm was very much swollen. The chief swelling was in front. The temperature was 102° to 103° F.; the man had profuse perspiration, but no chills, and no drop in the temperature. He had a practically uniform temperature, and was very, very ill. He was very uncomfortable, and was obliged to lie on his back, the slightest movement of the arm causing exquisite pain.

Dr. Erskine said that his first thought was that the condition of the shoulder was a secondary metastasis from a sinus thrombosis. The blood culture was negative. The headache and other symptoms disappeared after the operation. He then thought of meningitis, but the spinal fluid was clear and negative. The leucocyte count was 23,900, and 83 per cent polynuclear count. It was then thought that there was not a new focus—the temperature being the same as before operation —and that the joint was the chief condition. A general surgeon opened the joint and found three ounces of serous pus. The culture from the mastoid showed streptococcus, and the culture from the pus in the shoulder also showed streptococcus, and was said to be similar to that from the mastoid; also the pus taken from the ear before the mastoid showed streptococcus.

Immediately after the incision of the shoulder joint the temperature went down. Two days later an inflammation like erysipelas developed, but the temperature was dropping. Dr. Erskine said he would be glad to know if the members thought this was an erysipelas; he did not investigate it at the time, for he feared the patient might be put out of the hospital, but the surgeon agreed that it was erysipeloid in character.

The patient's subsequent course was uneventful, and he recovered. The drum discharged for six weeks.

Dr. Erskine said that this case kept him on the anxious seat for three days. It was evident that there was a suppurative arthritis of the shoulder. The question was whether the patient should be given the benefit of early operative treatment for a possible sinus thrombosis. As he was so ill, it seemed better to drain the shoulder first. As the temperature dropped there could not have been any sinus thrombosis.

DR. GRAEF did not think the ear had anything to do with the shoulder condition. There were two independent infections. He had only that day seen a boy of fifteen years, who had been operated upon on December 15th for a submucous resection, and who three days later developed a septic arthritis of the knee joint. The joint was opened and treated, and the boy will have a stiff joint the rest of his life. That submucous operation was done in a well-known hospital, and no doubt carefully. If sepsis could thus invade the knee joint, why not the shoulder, as in Dr. Erskine's case? Both the mastoid invasion and that of the shoulder joint might have been traced to an infective focus in the throat, teeth, or nose, both occurring at the same time.

DR. OPDYKE told of the case of a boy with a mastoid in the right ear and arthritis in the elbow, knee and ankle joint; a year later he had a mastoid on the other side, and had the same involvement of the other ankle, knee and opposite elbow. It was a simple mastoid, and there were no signs of lateral thrombosis at either operation, but he had a long convalescence. The ankle, knee and elbow were not opened in either instance, although they were involved for a long time.

Paper: A Modified Radical Operation for Chronic Suppurative Otitis. Lantern Slides and Demonstration of Patients.*

BY HUGH B. BLACKWELL, M. D.

DISCUSSION.

DR. CHAMBERS said that he did not clearly understand what the operation was and wherein it differed from any other mastoid operation, except in omitting to remove the incus and malleus, diseased or healthy.

DR. YATES said that on Randall's Island they had been trying to solve pretty nearly the same problem in children under fifteen years of age. This problem was to clear up the ears with as little after-treatment as possible and still preserve useful hearing. They had tried every operative procedure that had been suggested and some that had not. The difficulty with modified radical operations had always been that after bony

*See page 908.

dissection had been carried down to the tympanum, the ossicles were found to be embedded in a mass of granulations or swollen mucous membrane, so that it was impossible to determine the condition of the conductive auditory apparatus. Therefore, they were often impelled to finish an operation, planned on conservative lines, as a complete radical, rather than leave an undetermined pathologic condition behind.

So far as functional results were concerned, he was inclined to think that the radical, with skin grafting, gave as good results as anything that had been done. The Heath operation had been tried out, with flap cutting and without. Simple mastoid exenteration, combined with ossiculectomy or the Yankauer procedure had also been employed in appropriate cases with very satisfactory results. But there were many cases which must be classed simply as chronic suppurative mastoiditis. These drain through the middle ear without doing much damage to the latter, and if the focus in the mastoid was removed by a simple mastoid operation, taking care to remove all diseased bone in the region of the aditus, prompt healing with excellent function would result. Flushing out the tympanic cavity at the end of the operation seems to hasten recovery in such cases.

Dr. Yates also asked what proportion of perforations of the drum membrane healed after Dr. Blackwell's operation.

Dr. Guentzer said that Dr. Blackwell had not stated how he discriminates; it would seem that he selects those cases with a drum membrane, with a perforation. Bearing that in mind, it might not be fair to compare the results with the radical operation, as it is usually understood; and the hearing might be expected to be better than after a radical operation.

He would like to know whether Dr. Blackwell performed this operation on the ordinary cases where the ossicles were destroyed by necrosis.

Dr. Braun asked Dr. Blackwell whether he performed his operation in cases with cholesteatoma, and in how large a proportion of cases, he succeeded in getting a dry ear.

Dr. Hays said that most of the men had gotten away from the old idea that it is necessary to do a complete radical operation in every instance, and most men employ some more conservative method in many cases. In many instances he is him-

self satisfied with cleaning out the attic and antrum, and disturbs the middle ear as little as possible, and makes no flap at all—simply making a communication between the antrum and mastoid and middle ear.

Two months ago he did an operation on a girl who had had a discharging ear for six years. The girl's ear healed completely after taking down the posterior wall, and the hearing had considerably improved. In this case the dura and antrum, and the sinus and the middle ear were all within an area of a cubic centimeter, and it was very difficult to work upon, so it was thought best to do as little as possible, and allow the ear to heal up. In a number of such cases one can be quite conservative and yet get good results with chronic discharging ears.

Dr. McCullagh, referring to the Heath operation, said that if his memory served him, he had read a final report made by two Boston men on one case operated upon by Mr. Heath by his method and the end results were practically all unfavorable. In many of them it was necessary to do a secondary radical operation. As he understood Dr. Blackwell's method, it was very nearly akin to the Heath method, and the main objection to it was that it would not be applicable to many cases in which the radical operation is called for, in that it does not give an exposure of the middle ear.

He further said that in the cases in which he felt a radical operation was necessary, it was seldom that the incus was present. In a great percentage of cases needing operation, both the incus and the malleus are necrotic if present, and there is necrosis in the middle ear in regions which cannot be exposed by the precedure described. It seemed that most of Dr. Blackwell's cases were recent cases. It is well known that there are types of chronic discharging ear in which bone changes do not take place; these cases seem to be favorable ones for the Yankauer operation, which is even more simple than the one which Dr. Blackwell advocates. It would be interesting to know how Dr. Blackwell determines in what cases it is safe to leave the ossicles in place, and how he is sure that he has removed all necrosed bone.

Dr. Blackwell, closing the discussion, said that only one of the cases operated upon had cholesteatoma. In that instance

the patient was a boy who had had a discharging sinus for two years, and there was considerable cheesy material in the ear. His ear has not been dry for three years.

So far as acute symptoms are concerned in the cases that had running ear for six months, there were no acute symptoms present, but the patients had headaches and dizziness. The big stout woman had had headache every day for six months, and was very dizzy; she was seen by a number of men in the clinic, and a radical operation was advised.

As far as the drum was concerned, he had found that where the drum was practically gone there was no use in attempting to save any remnant. He had performed this operation on a young girl with a double condition, and she can hear the acumeter at twenty feet in the ear that has scarcely any drum at all; so it would appear that even in such cases there is apparently some advantage in leaving the remnant of the drum in position and not cleaning out the middle ear.

The trouble he has had in the cases in the after-treatment was that the granulations have a tendency to reform and accumulate in the upper attic, where a thick plug would develop. In his opinion the best way to treat such cases was to pack the attic very tightly until the secondary drum membrane forms.

There was no fixed rule in selecting or treating these cases. The only attempt was to select such patients in the clinic as showed a certain amount of intelligence and responded to the qualitative tests for hearing.

DR. L. M. HUBBY presented a specimen of

Sequestrum of the Labyrinth.*

DISCUSSION.

DR. GUTTMAN asked how soon the compensation took place.

DR. HUBBY, closing the discussion, said that the patient was seen only a few times except when in the hospital. As he had stated, the process was a slow one, and the compensation proceeded step by step with the slow destruction of the parts of the vestibular nerve.

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*See page 980.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of May 12, 1916.

Paper: The Social and Economic Aspects of Deafness.*

By A. J. Amateau.

BY INVITATION.

Paper: The Psychology of Deafness from the Standpoint of the Patient.†

By George W. Johnston, M. D.

The Partially Deaf Child.

Prof. John D. Wright said that he was always glad to have an opportunity of talking to persons who are interested in the deaf, for any reason, but was especially pleased to speak before the Otological Section of the New York Academy of Medicine, for these gentlemen were able to give the information to the parents of deaf children that they need at the time they need it. Every deaf child is taken to some physician, and the parents are guided by what he says in regard to the child. If the physician is intelligent and well informed concerning the deaf, he is able to deal with the child, not only from the specialist's standpoint, but when he has done everything that medicine or surgery permit, he can add still further to his service by telling the parents how to aid by education the imperfect organ with which the child must go through life.

The gentlemen who made out the program had shown unusual intelligence in dividing the subject into its three basal divisions as referring to the education of (1) those who are totally, congenitally deaf, or deaf from early infancy—the phase of the subject treated by Dr. Taylor; (2) those who are

*See page 930. †See page 942.

not totally deaf, but have a residual amount of hearing from infancy; and (3) those who have had the misfortune to lose their hearing after speech has been acquired. These are the various educational phases that are encountered in the schools.

Prof. Wright said that the phase which had been assigned to him could not possibly be covered in the brief time allotted, so he must content himself with trying to make two or three essential points clear. As most persons are more interested in what is seen than in what is said, he had brought three pupils from his school to illustrate some of the points which were most important.

First of all, it should be remembered, by the doctors especially, that a very slight degree of impairment of hearing is a far more serious matter to the child than to the adult. A degree of deafness which would not be a serious matter to an adult would be a grave handicap to a child, for it interferes with the acquirement of speech and language. It is surprising how very slight an impairment of hearing will interfere with the acquirement of speech. Even if the child's hearing is only very slightly impaired, it should receive special educational attention very early.

The next point of importance is to know how even a very slight amount of hearing can yet be made of service to a child. A child may have a very considerable power of hearing and, nevertheless, grow up without acquiring speech or language; and, on the other hand, with proper teaching, though only possessing a slight perception of sound, he can be given an approximately normal training. This reminded him of what the tramp who asked for work said when the lady replied that she had none for him: "Oh, ma'am! If you only knew how very little it would take to occupy me!"

The residual hearing, to be of any service, must lie within the range of the speaking voice. Undoubtedly it is worth while to spend time in training the residual hearing that lies outside the range of the speaking voices of men and women, but for education in language and speech, the only thing that is valuable to us is where the islands of hearing are within that range, and when this is the case a very little perception is valuable. If physicians and those interested in deaf children could only realize how very little hearing is required to fit a child to

lead a normal life, many more of them would have this training.

Unfortunately, one of the children Prof. Wright had wished to present at the meeting was ill and could not come. She represented one of the deafest of the cases that can be dealt with educationally. She is a girl of thirteen years, and was eleven when she came to Prof. Wright's school nearly two years ago. She had been for three years in a large institution for the deaf and dumb, starting when she was eight years old. While those in charge of the institution probably recognized that she had some perception of sound, they could not give her the individual attention necessary, so nothing was done for her hearing. Her father realized that she had some residual hearing, though it was not enough to affect the modulation of her voice, and though she has now acquired a considerable ability to comprehend language through the ear, she still has the modulation of a totally deaf child. When she first came under Prof. Wright's training she could not distinguish any vowel sounds, could not distinguish any words spoken into her ears, could not, indeed, understand what words meant. For two years, patiently and continuously, she has received training—the education of the brain through the ear—and today the teacher is able to read the greater part of her history lesson to her. This training was begun very slowly, first with the vowels and then with words, and today she can understand a great deal and it has had a great effect upon her language. She has been examined as carefully as any physician can examine a deaf child, and has been pronounced totally deaf in the left ear, with only a very slight amount of hearing in the other, which, he states, is through bone conduction. However that may be, we can communicate with her almost as easily through one ear as the other.

The first example shown was a little girl who came to Prof. Wright last January, only four months ago, at the suggestion of Dr. Yankauer, who, unfortunately, was unable to attend the meeting. She is seven years old, and has a considerable perception of sound. After some months of treatment, Dr. Yankauer made up his mind that he could do nothing more for her surgically or medically, but that this perception of sound was very valuable to her if she could be trained. She had, however, reached seven years of age without having acquired any vocab-

ulary. She knew a very few words—could say baby, papa, mamma, and auntie, but otherwise had no language, no speech. That was four months ago. Work has been done with her both through her eyes and her ears. She has been taught to associate a good many ideas with the imperfect sounds which she hears. She has to be taught a hearing vocabulary, just as she is taught a seeing vocabulary.

Ruth: (Demonstration. The teacher spoke directly into the child's ear and she responded, showing that she understood the sounds, although occasionally she was allowed the assistance of her eyes.)

The start is made with three sounds, a whistle, a bell and clapping of the hands, with the child's back turned. Sometimes it takes several weeks for them to distinguish between these three sounds. Then three vowels widely separated from each other in sound, and then these vowels in connection with words, putting the objects for which the words stand on the table and teaching the child to pick up the object named. The teacher first showed a few of the many words and sentences that the little girl has learned to understand through her ears, as, for example, "Shut your eyes," "Laugh," "Cry," "Brush your hair," etc. Then a few minutes were given up to showing rapidly the process by which the results had been obtained in the four months. First, the teacher spoke the vowels a, oo, ee, and the child repeated them. Then a toy car, and sheep, and a spoon were placed on the table, these words containing the same three vowels that were spoken, and the child pointed to the object named, then spoke the words herself. To teach the pronunciation of the words in the first place the help of the eyes were required. Then a new sentence was spoken to her, one she had never learned before, "Button your shoes." The sentence was spoken first without her seeing the teacher's lips. She did not understand it, although the words were in her lip reading vocabulary. The sentence was then spoken while she was watching the teacher's lips, and she at once responded. Then the sentence was spoken again in her ear; she knowing, of course, what was being said, responded at once. Then she was asked to brush her hair, and she responded correctly to that, but when the command "Button your shoes" was repeated in her ear, she did not respond. She had not yet

learned to perfectly associate the meaning with those sounds. After a few repetitions she understood readily, and that sentence was added to her hearing vocabulary.

Ruth had a considerable perception of sound, but it was not sufficient to enable her to acquire language or speech up to the age of seven years. If it is remembered what a child of three years with normal hearing can do, it can be seen what a handicap this child had at seven. In four months she has acquired a considerable vocabulary, and uses her knowledge in talking all the time. The amount of residual hearing has a great effect on her speech; it would not have been so clear or good if she had not this perception of sound. It has enabled her to modulate her voice and to speak much better than if she had been born totally deaf.

Virginia: This child is a little older and has a little more hearing than the other, and yet not enough to acquire language in the normal way. (The teacher talked into her ears, and the child repeated the words or answered very clearly. "How old are you?" "I am ten years old." "How tall are you?" "I am four feet eight and a half inches tall." "Where are you going this summer?" "I am going to Mankato." "With whom are you going?" 'With Auntie Madge." "How much do you weigh?" "I weigh seventy-nine pounds." "What is your first name?" "Virginia," etc.)

This child would never have had the speech and language which she now possesses, and would never have acquired an adequate hearing vocabulary, without patient, daily, persistent training.

Alice: Dr. Yankauer had this little girl in his office some years and removed adenoids and tonsils and treated her two or three times a week for two years. Prof. Wright regretted that he was not present to tell about her from his standpoint. She came to Dr. Yankauer without any vocabulary, without any language, without any understanding of words. During the two years she was with him, he and his wife gave her some education for her hearing and some training in the way of a vocabulary, in addition to medical and surgical aid, so that when she finally came to Prof. Wright she had a few detached words.

She was asked in a loud voice near her ear, "What do you

study in school?" (The child was very evidently nervous on being called to the platform.) "Geography, history, spelling, drawing, arithmetic, penmanship." "Where are you going this summer?" "I am going to the country." "Where?" "Lime Rock." (The child hesitated and was prompted—"Connecticut"; but corrected the speaker and said "New York.") "Have you any brothers or sisters?" "I have a brother." "Is he older or younger than you?" "He is older." "Have you any sisters?" "Yes, two." "Are they older than you?" "Twelve years old, and one year old." "How old are you?" "I am eleven years old."

In her studies she is about a year behind where she would have been if she had normal hearing. She is very nervous and highstrung, and was very much embarrassed.

Prof. Wright, in conclusion, said: I want you to carry home the idea that if a child has a little perception of sound it should not be neglected. Twenty years ago these children would have been sent into a school for the deaf and dumb, and would have come out deafmutes, with no understanding of speech. There is no reason why these children should be different from any others.

The Problem of the Education of Deafmutes.

HARRIS TAYLOR, LL.D. (by invitation): I was requested to bring some children with me tonight to illustrate what I have to say, as Mr. Wright has done, but I have "The Problem of the Education of Deafmutes," and it is too large a subject to so illustrate. Some phases of the problem might, perhaps, be so demonstrated, but in others nothing would be gained. Douglas Tilden, an artist of more than local reputation, once said that "the congenital deafmute was a born liar and thief, and that he would forget his mother in three days."

There is no question but that the congenital deaf child is exceedingly immature. His notions of property are not in accord with those of the average lawyer or minister, by any means. Whatever he can get hold of and take away with him is his until he is reminded that there is some competition in the matter of possession. Having learned that this assumption has its advantages, he resorts to it in many instances, so that it is not uncommon to see an ignorant, nice, sweet little

girl pick up a pencil or something of the kind and vow that she had never done it, and then, if she is caught, she lacks the feeling of humiliation that you or I would have, but in an indifferent manner says: "That is so, I overlooked it," and the incident is closed. Broadly speaking, the uneducated deaf child is a stranger in his own home. He knows nothing of how to communicate with his own people, and they accept him in the beginning as a mystery, and do not attempt to do very much for him. I am glad to say that now, thanks to many persons, such as Dr. Wright and others, there is much literature and information available as to how to treat the deaf child before he is of school age, but parents, as a rule, know nothing of this.

When I began teaching, I spent nearly all my spare time watching the children communicating with each other, to see what they had to say and how they did it. I took the children who had very little knowledge of English, and would communicate with them to the best of my knowledge, and then, for three years I was president of a society for child study, I conducted examinations into the memory of deafmutes prior to the period at which their education began, and I was very much surprised to learn that the child who entered school at eight years, with no previous instruction, could not remember as much of his seventh year as I could of my fourth or fifth, which shows that up to the time that the education began the child had notions of such a hazy nature that they made no impression upon his mind, and after his schooling began they passed from his memory to a large extent.

Perhaps the great difficulty in dealing with deafness is the difficulty of communication. In the beginning I used what is known as the finger alphabet, and quite naturally I thought that when I knew it and the child knew it, the problem was solved, and we could enter into communication at once. I soon found, however, that it did not solve the problem at all. Then I tried gestures, or the sign language; I used these with considerable fluency and could think in them, but here, again, I found that I could not communicate beyond the ideas in the child's mind. In the first place, there was very little communication, and in the second place, there were very few ideas in the child's mind; so that one of the greatest difficulties is to develop the child's mind, and then to place him in communication

with others so that he will not be a stranger in his own home. There are several methods of developing the child's mind, all having the same end.

First, the oral method—teaching the child to articulate and understand you from the motion of your lips and face. Next, the finger alphabet—spelling out each word; and, third, a system of gestures, which has been classified until it has been developed into a sign language, all having been used to enter into communication with the child and give him information, food for thought, and place him in communication with the world. Writing, also, is extensively used in this way.

The objectives in the education of the deaf child are to make him a God-fearing, law-abiding and self-supporting citizen. If you succeed in that, you have done fairly well.

Broadly speaking, congenitally deaf children with good minds will complete practically the eighth grade of the public schools in New York in their tenth or eleventh year, the handicap of deafness being that many years.

Then, there are a great many things aside from that. The ability of the child to adjust himself to things that he is out of harmony with. He has to go out of school and maintain a proper relation to his family when they do not understand him—a proper relation to the world around him, where everything he sees is based on hearing and adjusted to the hearing person. We want to make him happy and able to adjust himself to his environment.

Mr. Amateau has brought out some of the difficulties he encounters in helping the deaf to make a living. He has pointed out very clearly the ramifications of business requirements, and the time for all this is so great that the schools do not and cannot yet teach an adequate number of their pupils. It is a big problem to solve. We are trying to help him, and he is trying to help us. There must be a transition period when the school releases the child and before he has obtained the proper apprenticeship to equip him for his position in life.

The better he can communicate with others, the better he will be equipped; therefore, the more he can speak and the more he can read the lips, the more successful he will be, other things being equal.

Bearing this in mind, all the schools lay great emphasis

on speech and speech reading, the difference being in the extent to which it is carried out. In my school it is carried out to the exclusion of other methods of communication. In other schools other methods are followed to a greater or less extent; but all recognize the necessity of lip reading and speech as a means of communication with the hearing world, from which he must earn his living.

The problems are, first, to enable the child to become a law-abiding member of society and to support himself, and then to give him as much individual life as possible. They are often able to complete their work and go to college; but, broadly speaking, the congenitally deaf person will never get much beyond the seventh or eighth grade, and the industrial problem is a very great one in their training and should never be lost sight of; they should not only be able to follow a trade, but to understand their relationship with the hearing world, and accommodate themselves to their environment. This last is just as important as to learn a trade.

I cannot go into any details, but we have to develop them mentally and morally, teach them to adjust themselves to the form of society around them, enable them to make a living, and then give them as much of individual life as possible. These represent the real problems in the education of deafmutes.

The Relation of the Hard of Hearing Patient to the Physician.

DR. WENDELL C. PHILLIPS: The third portrait which you see on the wall to the left is that of the physician who gave to Mr. Johnston the keynote which changed his whole manner of life, and who gave to the otologists who are present here tonight a lesson and a sermon which is bound to do us all good. In the strain and stress of our daily work we are too much inclined to look upon these cases as merely cases and not as human beings; and we should enter more into the human side of the question of the relation of the physician to the deaf person rather than to devote our whole efforts to the scientific aspects of the case.

In dealing with the deaf patient, the otologist has to differentiate between the varieties of the deafness in the patients who consult him for treatment. You have tonight heard some of

these types mentioned. Inherited deafness, those cases which go from generation to generation, perhaps skipping one generation to again appear in the next; the deafness which comes on at from sixteen to twenty years of age (Mr. Johnston had some aspects of that type of case); invariably, no matter whether treated or not, the hearing of these persons gradually decreases until the time comes when outside help must be obtained for understanding the spoken language. We must recognize that that type of case is not greatly benefited by treatment, and yet there is a way in which the physician may be of real service to the patient.

Another has to do with purulent ear disease, abscesses of the ear in childhood. These cases require prompt and efficient treatment at the time of the primary attack. Children who have repeated recurrent attacks of abscess in the ear are liable to become permanently deaf; but if treated at the time of the first attack they can be cured, though sometimes it takes radical surgical measure to bring about a cure. This type of cases is usually amenable to treatment if taken in time, but if permitted by the parents or family physician to go with the repetition of abscesses in the ear, or without removing the adenoids and tonsils that are often the primary cause of the condition, or without doing a timely mastoid operation that may be necessary for the permanent cure of the case, the hearing will be lost.

Many persons have the impression that if a patient has a mastoid operation it means the destruction of the hearing; but the converse is true. In cases of persistent otorrhea or discharge from the ear, or of recurrent attacks of abscess in the ear that extend beyond the confines of the cavity, operation prevents deafness. In a majority of cases the simple mastoid operation can be done with resulting perfect hearing. It is important that those who do not belong to the medical profession should be aware of this fact. The operation is done in order to save the hearing and to prevent possible dangerous or fatal complications ensuing.

There is still another and a more common type of deafness; but before considering that, I want to refer to another type which has been described by some of the preceding speakers—partial deafness, or deafmutism. From the standpoint of the otologist, there are but few cases of congenital mutism—pro-

portionately, very few cases. It is my impression that very few children are born totally deaf. We know that there are some, but the majority of the cases of even total deafness come on after birth and are due to some inherent dyscrasia or early disease like inherited syphilis or epidemic cerebrospinal meningitis, etc.—they become totally deaf, but are not born so. Very few are born totally deaf. That emphasizes the fact which Dr. Wright spoke of—it is very rare in our clinics to find children that are totally deaf (except those that have had cerebrospinal meningitis). Though the patient may not know it, we know that he can hear a little. Only two days ago I saw just such a case—a child I had seen first at the age of eight months, who had inherited syphilis. The labyrinth and the entire ear apparatus was destroyed. That child has hearing in the other ear—not very much; but he is now four years old, and has not had any training, and has not acquired speech. It could be demonstrated that he has some hearing, and if he could be placed under proper conditions he could be taught as the children seen tonight have been.

The most common of all types of deafness is catarrhal deafness, and I wish to place great emphasis on one particular phase of that type. It is the general impression among the laity, and also among many of the medical profession, that the socalled catarrhal deafness is a disease of middle or advanced life. We see persons with catarrhal deafness begin about thirty or forty-five years of age to lose their hearing; therefore we say that it is a disease of middle or advanced life. This is not true. The basis of catarrhal deafness, in the large majority of cases, is laid during the days of young childhood. Fortunately or unfortunately, the deafness does not commence until later on in life. How do they come? The chronic catarrhal case is deaf because the patient has had repeated attacks of acute catarrhal trouble, and these acute attacks have occurred in childhood.

In my clinics I have taken pains to examine children of ten, twelve and fourteen years of age, and it is very common to find the ear drums permanently retracted and thickened, although the children hear, which shows that they have had repeated attacks of otitis media purulenta. It simply means repeated attacks of obstruction of the eustachian tube, due to colds in the head. If we were to test the hearing of those in

this room, one in every three or four would be found to be partially deaf in one ear. I am in that class myself. It is the effect of what you all have had—a cold in the head for two or three days, and then a feeling of stuffiness in the ear, a little bit troublesome, or perhaps a little ringing in the ear. The eustachian tube is temporarily partially closed, a partial vacuum results, and some changes take place in the retained air, and nature in her efforts to overcome the vacuum retracts the drum; then, later, serum is thrown out into the tympanic cavity, and if nothing is done some of that serum remains and undergoes what is called connective tissue formation, and slight adhesions result. That gets well, but another attack comes on, and sometimes there are several of these attacks in the course of the year. If nothing is done for them, the thickening and adhesions increase, and the time comes when the hearing is affected permanently and grows steadily worse. All of this can be prevented, and it is the prevention of catarrhal deafness that I want to emphasize tonight. I want to warn the parents of young children who suffer with these "colds in the head" that something must be done for the children if they are to escape serious results later in life. The treatment is very simple; but patients with this condition should have daily treatment for three or four days in the later stages of these "colds in the head." Catarrhal deafness could be entirely prevented if these patients could receive proper care in early life. It is not a disease of advanced life, but of early childhood.

Dr. Phillips here read a letter received the day before, in which a woman of thirty-five described herself as a working woman whose hearing was gradually becoming impaired, until she was liable to lose her employment, and her troubles were made worse by the fact that others depended upon her for support. She desired expert advice and wished an appointment at an early date, and appealingly hoped that something might be done for her improvement.

On the same day other persons consulted him, suffering with the same type of condition, one of them a young Jewish man who still holds his job. He became an expert before he became deaf, but he is down and out so far as his hearing is concerned. Nothing can be done for his hearing. In addition to his growing catarrhal deafness, he has worked in a noisy place since he was a lad. I can do nothing to help him,

and I had to tell him so. I finally got his mind on the subject of artificial aids to hearing, and then in the most tactful manner that I was capable of I brought him around to see that he could not be helped by treatment. These are experiences that come to us every day, and it behooves us as otologists to always bear in mind the human side of the patient. It has been my experience to have many letters like that just read, and the older I grow the more of such letters do I receive. Most of these patients have been in the hands of quacks, and that is a point I always impress upon them. Don't heed the advertisements of aids for the deaf, because not one of them will have any effect. Keep in touch with a conscientious otologist, even though he has no treatment to help. I have many such patients who come to me once in two or three months—some of them because they are downhearted and come for inspiration. They know that I am not going to treat them, but they find it worth while to come for such help as I can give them. This is the relation of the deaf person to the otologist.

Miss Kearns (Principal of Public School 47, School for the Deaf): I was asked by Dr. Hays to come here tonight to say a few words about the vocational work in our day school. It is very important, for we feel the necessity of following our scholars beyond the walls of the school. At first we found it very difficult to get the outside world to accept our children, even though we had done something for them; but at present I am very happy, for people are coming to our school and asking for our children for positions, asking for more children than we have ready. Of course, we have not done anything as big as Mr. Amateau, for we have just begun, but we have been able to keep close to our children. We have had them meet us once a month in social meetings—at first in the evening, and now on Sunday afternoons. They come to us and tell us how they are getting on in the world. In order to get some statistics, we prepared a little card, which reads as follows:

What is your name?
Where do you live?
Where do you work?
(Give the name and address of the firm.)

How much do you earn? (Be honest in answering this.)
How long have you worked in this place?
What kind of work do you do?

These cards are just beginning to come back to us; we have had seventy this week. We do this to keep close to the children.

We found that by sending out to the trades and finding out what they wanted and then preparing the children for the special thing asked for, we could place our pupils more readily. Then we keep in touch with the firm by inquiring how the children are doing. When they reported that the children were slow, we tried to show our children and young people that they had to be quick, and to learn to do things quickly. Then we found out that it was very hard to get them to come early in the morning, and that the day seemed very long to the beginner. Eight weeks ago one of our industrial teachers called the boys together and told them how time cards are kept in business houses, and how it was part of an employe's work to be on time. Now for eight weeks we have had fourteen boys coming in at eight o'clock, signing their time cards, and working earnestly until the bell rings for the regular work of the school day.

We have been very fortunate in our industrial teachers. They have all worked in the trades, and so have a practical knowledge of business. I thought the best way for you to know something about this was to let you see some of my graduates, and let them tell their story. I wrote to these pupils, asking them to write a three-minute composition telling about their work. They are now here to tell you in three minutes how they are getting on in the world. The first girl became deaf when nine years of age, from spinal meningitis. She is now working with a well-known firm of manufacturers of children's clothing. She spoke as follows:

"I was graduated from Public School 47 last January. Soon after, through my teacher, I obtained a position with a firm of manufacturers of children's clothing. I am in the millinery department. I make children's hats. I also make the flowers and the trimmings. There are three of our girls employed there. The forelady says I am a very good worker, and I read the lips very well.

"This dress I am wearing is my graduation dress, which I made myself. I also made and fringed this sash and I made the silk flowers on my hat. Here are some silk violets made by the girls in the school, and the boys made the box to hold them.

"There are different kinds of deaf people in the world. Some do not try; they are afraid. But I mean to succeed. I have my two hands and my two eyes, and I can talk and read the lips, as I am not afraid."

The next girl became deaf when seven years old. She is employed by the Waterman Fountain Pen Company, and is making cases for the pens.

Amelia read in a very good and distinct tone the following letter: "When I was seven years old I lost my hearing. For three years I have been working for the Waterman Fountain Pen Company. It is very interesting, and I have improved very much since I went there. I cover and line the cases for the pens. Here are some I made. I like my work. I can read the lips of the foreman and the other workers, and they understand me when I speak. I have been promoted once and I hope I shall be promoted again."

The next boy is employed by Charles R. Lamb, the artist and designer. He was born deaf. He spoke as follows:

"I was graduated from Public School 47 in 1912. The following fall I obtained employment as draughtsman in the studio of Charles R. Lamb. I take all orders from my employer's lips and find no trouble in doing so. I also converse with the other people in the studio. I have had a raise in salary, and I am happy in my work."

The next boy will be graduated next February. He has not quite finished his course. He has done some very good work in lettering, and we feel that we can easily place him in an architect's office. The young man spoke very clearly as follows: "I became a pupil of the school for the deaf about four years ago, and since that time I have made great progress in industrial design, particularly in learning the different styles of letters and the ratio upon which they are built, and also the process of laying gold leaf and other processes employed in sign writing. When I graduate I hope to enter an architect's office, where I will learn the trade of designer. These are some

of my signs. This one shows how I use the gold leaf. This one shows another process of putting on a red background. This is some of the work which I have made outside of the school. It is also the number of our school. Some of the hearing schools down town are going to have a Shakespeare pageant, and I am making some signs to show the road to Shakespeare's country. This is 'Warwick, 3 M.' It is not finished, but I will finish it now."

These compositions are all of the children's own writing. I have not seen any of them. The last boy who will speak to you has had a chance to go to high school; two boys have finished two years in high school. One boy now in the Stuyvesant High School has done very well. At the end of his first year he stood highest in his class. Another boy is in the East Orange High School, and a third is in the high school in Bloomfield, New Jersey.

The boy in the East Orange High School also addressed the audience very clearly and distinctly. He said: "This reminds me of an incident in my life before I came to the school for the deaf. I was in the grammar school, and at that time I had a very imperfect speech. I was anxious to overcome that. Among the advertisements I learned of an article which advertised that it could make your voice good, and was used by singers and speakers. I thought it would improve my speech, so I went and bought it. It was Lymole Trochees. I ate a whole box, but they didn't help my speech.

"I went to the grammar school before I came to the public school to learn. I did not learn much there. Things were not clear to me. I did not know enough to help myself. I could not hear clearly, and I became confused. The day I entered the school for the deaf is a milestone in my life; the door to a new world was opened to me; everything was made clear to me, and, best of all, I was learning to speak right. After a busy and delightful three years in that school I graduated. I was at first reluctant to enter high school, for I remembered my grammar school experience. Now, after two years, I am finishing half of my course, and in that time I have made a record of which I am not ashamed, and I hope to attain a college scholarship.

"I do not hesitate to take up the different activities of school

life. I am a member of the track team and have made a name for myself. I have here one of the many tokens that I have won in the past two years. Among the trophies that I have won are two cups. The last one that I won was third prize in the one-mile championship of America, about three weeks ago.

"Besides that, I am now a candidate for the position of editor-in-chief of the high school magazine. I have written for that publication several times. I am also to take part in a play to be given later this month. My principal, Miss Kearns, and the teachers, are steadfast friends and are among the best I have. Through them, and the oral method of teaching the deaf, I have been able to make a success during the last few years. Through these teachers I have learned to say 'Where there is a will there is a way,' and subsequent events have made me a firm believer in that saying. As you have seen, I am not the only one who has been helped by the oral method of teaching the deaf. I believe the lip reading method is the best in the world for the deaf."

Miss J. D. Clark (Assistant Principal, New York School for the Hard of Hearing): I feel highly honored to be asked to take part in this meeting tonight, and I am very glad to tell what lip reading means to the adult hard of hearing. It is a joy and a privilege to teach lip reading because of the difference that it makes in the lives of deaf people.

I consider that the spiritual factor of lip reading is quite as important as the mental and physical. If the spirit is not willing the flesh cannot do much.

Most of the people who come to us are eager to learn; eager to be aroused from the depression and mental sluggishness into which deafness has caused them to sink, and it is wonderful to see the difference that lip reading makes in them in a short time. The very expression of their faces changes, and from hopeless, discouraged people they grow to be hopeful, courageous people. Seeing others bravely fighting the same handicap inspires them to do likewise.

But sometimes people come to us not because they want to come, but because their families make them come. They have the attitude of "I can't learn. It is too hard." The first thing to be done is to change that attitude; to make them see that they can learn. It is seldom that this cannot be done.

I have in mind the case of Miss B., who took lip reading several years ago. She came because her mother made her come, she, herself, being opposed to the idea of lip reading. In a very short time her attitude was completely reversed, and when she left the school she was one of our best lip readers. But more than that, she had overcome her mental depression. When she went away she said to me: "If only one person out of seventy-five learned to read the lips, you are doing missionary work because of the cheer you bring into the lives of the deaf."

This pupil later took the normal course and is now teaching lip reading herself. Many of our pupils do this, seemingly in an effort to help others as they have been helped, as well as to provide for themselves a means of self-expression and support.

Mrs. T. is one who took this course, and the change it has made in her was evident to a relative of mine, who knew her when she first became deaf. This relative went to call on her at that time and found her quite hopeless to talk to, as she would not even look at the speaker. Last year my relative saw her again and found her full of life and enthusiasm for her work; the kind of person it is a pleasure to be with.

It was not so very long ago that many aurists opposed lip reading for the partially deaf, on the ground that the hearing would deteriorate if too much dependence was put upon the eyes. Most of them have changed their opinion, I believe, although there are still some who hold to this view. This has not been the result in my case, for I knew that I am not any deafer than I was when I began the study of lip reading twelve years ago. The fact that I use what hearing I have probably has something to do with this. I always watch the lips, but I hear what I can at the same time.

We always instruct our pupils to do this—to make their eyes and ears cooperate, so that lip reading is an aid to hearing, not a substitute for it, and the strain on the ears is relieved just enough to be good for them.

We have had aurists send us patients who were very nervous from trying to hear, and the lip reading relieves this nervous tension and generally improves the person's health.

Mrs. M. writes: "Somehow, since taking lip reading I've

calmed down. When people talk to me my face doesn't twitch nervously. I hardly ever get flustered. I feel more now as if I could hold my own than I ever did before. Not that I always know what folks are talking about, but I am better able than before to get along."

Miss C., a teacher of a large kindergarten, writes: "When I became deaf it was no easy task to keep on teaching. The lip reading has made it much easier by relieving the strain."

Lip reading is harder for some than for others to learn, but almost any one can acquire it if he or she will keep at it long enough, and it is well worth the effort. While it is not the same as two good ears, it is a very great help, and armed with a knowledge of lip reading, one still has a fair chance among men to work and play.

DR. WALTER LESTER CARR said that the education of the deaf should include sociologic and economic interests, to enable them to make their way in competition with normal people, and to give them interest outside of themselves.

He confirmed what Dr. Phillips had said in regard to the small number of children who are congenitally deaf. This he had verified by his observation of many children. Very few are congenitally deaf, although they are usually so classed and accepted. From the pediatric standpoint, he agreed with what Dr. Phillips had said in regard to the prevention of deafness. A great deal can be done toward preventing deafness in children who have suffered from scarlet fever, measles, influenza, etc.; also in children with diseased tonsils, adenoids and nasal deviations. These children are almost invariably seen first by the pediatrician, and careful, simple treatment at the proper time would prevent many cases of deafness. There is no group of cases that offers better opportunity for a physician to care for a child and prevent future injury.

MR. AMATEAU said that it was all very well to show what wonderful results were accomplished by the oral method of teaching the deaf. He said he recognized that the oral method enables the deaf to speak and receive orders from their employers and foremen and others who must communicate with them by word of mouth, and that such work as had been demonstrated tonight had much value as far as industrial needs are concerned.

It was all very well to point to these children who had some hearing and who had become deaf after a few years, but he would like to see a person who had been born deaf or had become deaf very early, and then acquired speech in a school for deafmutes, understand from the floor from the movement of his lips what he was saying while standing upon the stage. If he could see this done, he would become a convert to the exclusive oral method of teaching, but he did not believe it possible.

He had tried it in a number of cases. He had been with Mr. Wright's graduates and with Miss Kearns' graduates, and had placed a number of Dr. Taylor's graduates, all of whom were taught exclusively by the oral method. He further said that when you get heart to heart with them, they agree that it is the very hardest sort of strain upon the eyes and that it is impossible to read the lips under such conditions for more than five minutes; that they must depend on some larger means of communication; so that while he believes that speech reading and articulating are industrial assets, yet if the deaf man is to enjoy religious and other lectures and social meetings (which he must have) he must learn to depend upon something other than mere lip reading. People should not gain the impression that lip reading meets all the requirements of the deaf. Any number of deaf people will tell you that they cannot depend upon it, and that they depend more upon the sign language; witness the fact that a majority, if not all the graduates of exclusive oral schools, communicate by signs with their fellow handicapped. Speech reading and articulating should be taught as much as possible for the opening of the mind, but there are boys and girls who are not bright enough to acquire an education through the oral method exclusively, and they should not be taught just lip reading and articulating, as mere parrots, and sent out into the world to make their living. He had had to take that kind of product from the schools and place it and try to make something of it. It is an injustice to the boy and girl, and an injustice to society. Such persons should be taught the sign language also, and educated through the sign language, when the oral method failed.

The object is to make them useful and intelligent citizens, and no one can become such unless he understands what the

world is and what his privileges and duties to society and himself consist of. It is not only the means of communication that a deaf boy needs, but also an education, so that when he does talk, he should know what he is talking about.

PROF. WRIGHT said that he had not expected to say anything further, but that he must make some response to what Mr. Amateau had said. He felt that he was fairly familiar with the English language, and yet he had not understood more than one-third of what Mr. Amateau had said when reading his paper on account of his foreign accent. Now, a lip reader who has been accustomed to perfectly normal English speech would find it very difficult indeed to understand him, but he could become accustomed to it, and in the course of time, by associating with him for an hour or so a day, he could learn to understand him.

Mr. Amateau's speech was exceedingly difficult to understand, even for a hearing person.

In regard to signs or oral teaching, Mr. Wright said that he differed from Mr. Amateau. It was possible to learn the sign language so that it could be used with a reasonable amount of facility in from two to twelve months. It was possible to learn the finger alphabet in six or eight weeks, and use it with fair facility. It was not possible to learn to speak or to read the lips in less than from five to ten years and to use speech as a natural mode of expression, a living vernacular and not a translation. It is an easier thing to educate a child with signs and finger spelling; it is an easier means of communication, and if the world as a world used signs and finger spelling, it would be well to employ that method generally for the education of the deaf. But it is not a universal means of communication, and if each deaf child is to reach his own individual highest efficiency in speech and speech reading, he has to have it all through his educational period.

Personally, he had no more objection to the sign language than to French or German. His objection to its use was during the educational period, when the mental habits of the child are formed. After they have acquired the ability to express themselves, there was no objection to their learning the sign language and finger spelling. Both have their place, but not in the educational period. It destroys the ability to learn

speech in its highest possibility. One cannot make a Paderewski out of every person that plays the piano, nor can you make a brilliant speaker or lip reader of every deaf child, but you can give each one the highest efficiency he is capable of. You cannot do this so long as manual methods of education enter into their early training. If, when he is eighteen or thereabouts, he wishes to learn to use and understand the sign language and finger spelling for the sake of attending lectures and to associate with deaf persons whose lips he cannot read and who cannot understand him, there can be no possible objection.

Prof. Wright, referring to Mr. Amateau's remarks, said that he could talk to scores under his personal teaching by the oral method, and could talk to them for an hour. Not long since he had made a speech at a dinner given by the graduates and pupils of the school, and they cheered at the right place and gave him to understand afterward that they approved or disapproved, as the case might be, what had been said, and one of them, who was born totally and congenitally deaf, and had never heard a sound in her life, wrote a correct verbatim report of what had been said.

Dr. Harris Taylor said that he felt as Mr. Wright did in regard to the sign language and finger spelling, or the manual alphabet. His own experience dated back into the last century. For two and a half years he taught the deaf by means of the sign language, interspersing it with the use of language written or spelled, and by this method allowed eight or ten pupils who had a residuum of hearing to become deafmutes.

It was only with some pressure that the oral method was introduced into the Texas school. He had asked for it to be used in two classes, though he did not expect anything remarkable from it. He became convinced, however, that for school room purposes, spoken and written and spelled English should be used, and for a period of four years he followed that method, using no gestures at all.

Then for seven years he tried the oral method in the school room, using speech and lip reading and writing as in actual life, without the use of finger spelling or signs.

Then he took charge of a school, directing it in two divisions, part oral and part manual, supervising that work for seven

years, and after that for another seven years he supervised work in a school where the pupils were taught by the oral method alone.

As an educational measure, if he thought that if the child sacrificed anything at all in the use of language as taught by the oral method, he would not hesitate to use the sign language, but it is not necessary. In the best schools of today, and those which carry the children highest in a given time, the English language only is used in the school room.

Another point of importance was that in the formative years of the deaf child he should be taught to use and observe the lips for talking to those around him. He is not educated to be a leader in a deaf and dumb community, and every one that can be educated away from a deaf and dumb community represents good service rendered.

Dr. Taylor said he thanked the Lord that he had been able to contribute something to society by taking deaf persons and educating them to lead a normal life with other persons.

When it comes to the pleasures of life, if the deaf find any help or pleasure in the sign language after they have acquired the habit of speech and speech reading, let them have it. If they find it in finger spelling, let them have it. They should not be deprived of any joy or advantage that can be found in the sign language or any other way. If any group of adult deaf persons wished him to address them in the sign language. he would be glad to do so, but as an educational factor he believed that the oral method meets the conditions best for the comfort and enjoyment of life. During the formative years in school they need the English language to qualify them for this and for mingling with those that they must make their living from in after years.

DR. PHILLIPS, referring to the remarks of Dr. Taylor, said that they constituted a very strong argument in favor of the speech method of teaching the deaf rather than by signs. From observation of the young people who had spoken tonight, he could see also that they think more quickly than those who use the sign language. In his opinion, there was no question but that it was the proper method of teaching the deaf. One point, however, had been neglected by all the speakers. None of them had said anything about how early in life these children

should commence to receive their instruction. He recalled that in his undergraduate course Dr. Wm. H. Thompson had laid much emphasis upon the degree of education gained by the normal child under three years of age in comparison with what he learned later—motion, speech, emotions, ideas, etc., all before the age of three. If he is deprived of hearing and his education for speech is delayed until he is six years old, he has lost much valuable time. In his judgment, children that are deaf ought to be brought under special instruction earlier.

The work for the deaf in the public schools is one that New York has reason to be proud of, and ought to receive the support and encouragement of the public, and a better building should be provided for it. The public knows very little about what is being done for these children, and more publicity should be given to it.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of March 21, 1916.

DR. OTIS H. MACLAY, THE PRESIDENT, IN THE CHAIR.

DR. H. B. YOUNG, of Burlington, Iowa, by invitation, presented three cases.

Congenital Absence of Soft Palate.

DR. YOUNG said that all the members had probably seen cases of congenital absence of the soft palate. The problem of repair by operation or prothesis was before him in this case, and he had had an expression of opinion from the members.

Oralism for the Deaf.

The second and third cases (two adults) furnished an excellent demonstration of the finished product in oralism. Case 2 and his colleague (Case 3) are the managing officers in Chicago of the National Fraternal Society for the Deaf. Both are equally capable business men. Dr. Young showed them in order to demonstrate what actually takes place in the matter of development, education and social uplift of the totally deaf by the different means of education. It has been said by some that the speaker is opposed to oralism. He is not opposed to it; but he would not want the profession to believe that in pure oralism we have a solution of the problem of what is to become of the incurably deaf. (The first of these two patients—semi-deaf and semimute—then gave the history of his ear condition and education, which demonstrated that pure oralism does not do what is claimed for it in adult life.) The second of these patients could read the lips only very imperfectly, and depended on signs.

The main point of Dr. Young's contention is that the propaganda of oralism approaches charlatanry; and that as otologists it is our duty to tell these patients what may be done, and the limitations of oralism.

The first man said that the consensus of opinion of the educated deaf all over the country is in favor of the combined method of education, and utterly opposed to the use of the oral method exclusively.

Dr. Young then called attention to the difference in the voices of these men.

DISCUSSION.

DR. KENYON asked if there had been any attempt made to change the tone of the voice, to which the first patient replied that he was once sent to a teacher who tried to do this, but not with very much success.

DR. SHAMBAUGH said that the great object of oralism was to allow these patients to talk with others who were not deaf and did not use signs.

DR. YOUNG replied that we all unconsciously use signs in talking. The pure sign language is universal, and everybody can use it. This is carried out by the "movies."

DR. KENYON asked if Dr. Young were not minimizing the advantages of the oral method.

DR. YOUNG replied that he did not intend to do so, but thought that it had not benefited the deaf very much; that is, not so much as was expected.

DR. KENYON asked if it was not dangerous to put forward the sign method too prominently. Does it not lead to laziness on the part of patients? Would not the tendency be to give up the harder method in favor of the easier?

DR. YOUNG said that the majority who have not investigated the sign language do not understand it. It is a pictured idea.

DR. ARTHUR M. CORWIN asked if it did not make a great deal of difference, to even the patient, in a mixed crowd, as to who is speaking. To which the semideaf patient replied, that if people did not try to make it easy he could get along very well. The exaggeration of movements of the lips confused the lip readers very much.

DR. KENYON asked if the totally deaf man who was more dependent on signs could do as well as the lip reader, to which Dr. Young replied in the negative. He had tried to learn lip reading, however, and could not master it; so what was there to do about it? The combined method was the most useful.

DR. J. HOLINGER asked how long these two men had had lessons from competent teachers who had had a long experience, and could show other results. About eighteen years ago he had showed before the Chicago Medical Society two men, both of whom became deaf much earlier than either of those shown by Dr. Young, one at four, and the other at six. It is well known that it is much more difficult at that time to preserve speech. Both of these patients had very competent training. One spoke German and learned English after he was full-grown. The other one spoke German and French, when he came to this country and mastered English without a teacher. He is a typesetter, and acquired a correct pronunciation and spelling. Very much depends upon competent teaching and long enough training at a time when the patients are really receptive.

DR. YOUNG, in answer to Dr. Holinger, said that in contrast to his two cases, Mr. and Mrs. Bayliss, who are teachers in the deaf school at Belleville, Ontario, are examples. Mr. Bayliss lost his hearing at the age of seventeen. He naturally speaks very well. His wife lost her hearing before seven, and speaks poorly. Mr. Bayliss cannot read the lips at all, with all the effort he has put on it. His wife is one of the most expert in this country at lip reading. The difficulty is not in speech, but in training the eyes to interpret the signs made by the lips in speech.

Case of Syphilis and Carcinoma, Possibly Both.

DR. GEORGE A. TORRISON presented a patient, Mr. W., aged fifty years. This man's wife died in 1906, probably of tuberculosis. Father died at the age of ninety, of old age. Mother at eighty, of old age. One sister died at twenty-nine, probably of tuberculosis; one died in childbirth, at thirty; one sister living, at thirty-four. He has two brothers living, aged forty and thirty-six, both healthy. Seven brothers and sisters died in early childhood.

The patient had gonorrhea at the age of twenty; also had a sore on the penis, with adenitis. No venereal symptoms for past thirty years. Has had slight attacks of muscular rheumatism from time to time for several years. Has had no attacks for last four years.

The present trouble began in September, 1915, with difficulty in swallowing. He felt as though something stuck in his throat, which he could not get up or down. This difficulty in swallowing gradually increased until he was unable to swallow solid food. He has never complained of actual pain, but swallowing became more and more difficult, until sustenance was limited to liquid food. He has lost about ten pounds in weight.

In December, 1915, he was operated for fistula in ano; since then there has been more or less constant discharge.

When Dr. Torrison first saw the patient, last January—about two months ago—he could only swallow liquids, but had no pain. The voice was unaffected. The epiglottis was about all that he could see, on examination; it was one nodular mass. A Wassermann was made, which was slightly positive, and the patient was immediately started on antisyphilitic treatment. He has taken about thirty mercurial inunctions, combined with iodid of potassium, three times a day; also injections of cacodylate of sodium, the first of three grians, and the last four injections, twice a week, of five grains each. Shortly after beginning this antisyphilitic treatment the appearance of the epiglottis changed. From being one mass, it became a cleft affair. Swallowing has been easier, so that now he is able to swallow solid food—with some little difficulty, however. There has been some glandular involvement on both sides of the neck. had consulted the speaker on account of obstructed nasal res- The glands on the right side have disappeared under the antisyphilitic treatment. There are still one or two on the left side.

Dr. Torrison brought the patient to the society to get some light on the diagnosis. He has thought that the diagnosis lay between syphilis and carcinoma, possibly a combination of the two. Although there appears to be some tubercular history in his family, he thinks tuberculosis can be excluded, because there are no lung findings, no elevation of temperature, no pain on swallowing, and if it had been tuberculosis, he thinks the process would have progressed much more rapidly than it has under the large doses of iodid of potassium he has been taking. He does think there is a syphilitic element in the case, but whether it is purely specific or a combination of syphilis and

carcinoma, he could not feel sure. It has yielded very slowly to treatment. He has been under treatment for two months, and a week ago he began to complain of loss of appetite, so the iodid of potassium was stopped, and the appetite has improved. Since stopping the iodid of potassium he has gained two or three pounds in weight. He had an accident while under treatment, being run over by a motor truck, and was in bed for three weeks, and has not felt quite so well since that time.

Adhesions of Posterior Pillars to Posterior Wall of Pharynx.

Dr. George W. Boot showed a young man who had adhesion of the posterior pillars to the posterior wall of the pharynx. He piration, which was due to a defective septum, and had no connection with the condition in the throat. The patient knows nothing of when the throat trouble began, but gives a history of having had scarlet fever when a child. The speaker thought the condition was undoubtedly the result of an ulceration of the throat from the scarlet fever. There was only a narrow opening, about one and one-half centimeters long, and one-half centimeter wide in the midline. There is evidently a band underneath, which is adherent all the way across.

Dr. Boot intends to separate each pillar from the pharyngeal wall and put a mattress suture through, bring the ends out and tie them, so as to fold the pillar on itself, and let the pharyngeal wound heal by granulation. The pillar would be covered on both sides by mucous membrane.

DISCUSSION.

Dr. C. M. Robertson said he would like to see how much contraction occurred after the operation described by Dr. Boot. He thought it probable that the operation would have to be repeated.

Case of Decompression of the Hypophysis.

Dr. Otto J. Stein said that the patient was operated on about three weeks ago by the transsphenoidal-nasal route, the operation being done upon his sella. He was operated for blindness, which had been present for five years. He was blind even to light. X-ray showed tumor in the neighborhood of the hypophysis, causing pressure. The patient did not present any of the symptoms of hypophyseal disease. The

only thing that indicated involvement of the hypophysis was the blindness, aside from the condition shown by the X-ray picture, which was a very good one. The speaker's principal reason for bringing the patient was to demonstrate what the rhinologist can really do by a decompression operation. Of course, decompression operations can be done otherwise than inside the nose, but the rhinologist has in his field an avenue of approach that is, in the speaker's opinion, even superior in its simplicity, in its safety and in its final results, than the general surgeon has, by the frontal or temporal, or through the oral transsphenoidal route. Then, too, the rhinologist has a technic at his fingers' ends that does away with many of the disagreeable features of the transsphenoidal-nasal route that the general surgeon employs.

In following Hirsch's technic, a simple submucous resection of just enough septum to reach the ostium of the sphenoid, and removing only one middle turbinate, are necessary. The speaker has done that in all of his cases, but only because all of them have had rather small nostrils. He thinks that in people with very large nostrils that would not be necessary even. But you do require a little bit more room than you get in an ordinary nose without removing the middle turbinate. That, of course, means nothing at all to the patient. We leave no disagreeable result; no dryness; no disfigurement; no loss of the sense of smell or discharge or other deformity in the patient's head by such a technic, and still have all the room needed.

This patient was operated under scopolamin-cocain anesthesia, with the patient perfectly conscious and talking all the time. He did not have any pain to amount to anything; even the entrance into the cranial cavity did not cause much pain. The result is very gratifying. The man can see very well the ordinary objects about him. He can also distinguish colors. He is able to get around very well alone.

The pathologic findings will be reported at a later meeting.

DISCUSSION.

Dr. J. R. Fletcher had seen the operation on Dr. Stein's patient, and was very much pleased with the brilliancy of the work. Dr. Stein did a submucous, removed a minimum of the

septum and one middle turbinate, took down the anterior wall of the sphenoid, and then the floor of the sella. It could all be seen very distinctly by the speaker. There was no blood to speak of. The pulsation of the hypophysis could be seen. He was impressed with the ease of approach in an area which until recently had seemed unapproachable. And yet there was all the room desired without cutting of the lip or nose.

Dr. Fletcher referred to a case reported before the society several years ago by Dr. Kanavel. However, he thinks the operation described by Dr. Stein is infinitely superior to any other for this work.

Paper: Intramural Malignant Tumor of the Lateral Wall of the Nasopharynx.*

By Edward P. Norcross, M. D.

DISCUSSION.

Dr. Otto J. Stein wanted to emphasize some of the points brought out by Dr. Norcross, in regard to malignancy in the pharyngeal space, because it has a direct bearing on the subject of malignancy of the postnasal space. He saw a patient some years ago (the wife of a physician), who referred the pain to the left tonsil. On very close inspection the case did not show anything at all. She had been operated years before, and there was some scar tissue very deep in the fossæ. There was no evidence of irritation. Dr. Stein told the patient and her husband frankly that he did not know that there was anything the matter with the left tonsil. He made an application of Lugol's solution, which had a very beneficial effect. She returned in a week or so for another application, because she said it helped her so much, and she kept coming back. The speaker told her there was no sense in her coming, because he could not see what effect the applications would have. He decided it was a case of hysteria. She finally fell into the hands of a neurologist, who also said it was a typical case of hysteria, and Dr. Stein was glad to have his diagnosis confirmed. Shortly thereafter she returned to Dr. Stein, because she said

*See page 967.

she did not think the electric treatments given her by Dr. Grinker were benefiting her, and that Dr. Stein's treatments did her more good. The topical applications were continued, but she came at greater intervals and was suffering more. He did not see her for a long time, and one day a colleague told him that she had been operated on for carcinoma of the esophagus. Dr. Stein then realized that probably he had a case of carcinoma of the lower pharynx to deal with, which he had not suspected. This was in the days before the common use of direct laryngoscopy. This ulcer was discovered in the neighborhood of the cricoid. She had no trouble in swallowing, early in the course of the trouble. It was all referred to a pain in the left tonsil. Of course, later on the evidences of ulceration and breaking down of tissue became more manifest, and the diagnosis was easy.

This case taught the speaker a lesson about referred pain, and not long after that he had another similar case. This time, instead of merely looking at the nasopharynx, he looked at the lower pharynx also, and found the same condition of infiltration in the lower pharynx, beginning with the esophagus, which turned out to be malignant, and later was operated on.

Dr. Arthur M. Corwin said that all of this goes to show that all of us, who are used to seeing many cases of a given sort, are apt to become contracted in our way of viewing them. We specialists look through a narrow hole at the pathologic world, unless we have an invariable system, even when busy, of making a complete examination of each patient, from head to foot. In saying this he was soliloquizing. Most of us who have been in practice for a quarter of a century can remember just such cases, where we have overlooked one thing in centering our vision upon another, failing to take a general account of stock.

Dr. George M. McBean said the case cited by Dr. Stein reminded him of one he saw only the week previous. Dr. Lewy saw the patient with him. This patient complained of throat trouble for two years—the principal complaint being of pain in the throat on swallowing, extending up to the ears. She went to a physician, who diagnosed it as rheumatism of the pharynx. She had some carious teeth, which were extracted, but still the rheumatism continued. So she went to

another physician, who found she had a retroverted uterus. A ventrofixation was done. The uterus fell back to its original position two weeks later. She had a third operation, and had a normal uterus removed. That did not improve the rheumatism of the pharynx at all. Then she hunted up a foot specialist, who put some braces under her arches. She wore those for some time, but still continued to have rheumatism of the pharynx—in fact, this condition was increased. She declined a tonsillectomy, which had been advised. Last January, about twenty months after the onset of the trouble, she spit up some blood, and so they decided she had tuberculosis, and put her out in the back yard, in a temperature somewhat below zero, and gave her an electric pad to keep warm. That did not cure her either. Then they started in with injections of tuberculin. Two other kinds of vaccines were made, to be given on alternate days, and she was also having internal medicine—large doses of the salicylates. She lost fifty-five pounds. This woman was forty-three years of age. When she came to see Dr. McBean she was just able to hobble in, and had a marked cachexia. She had a very beautiful epithelioma just below the arytenoid cartilages, which had ulcerated, with a slough on the top of it. He recommended a surgeon for a gastrostomy, and also suggested the use of radium. The internal medication was stopped, and the patient has gained a little in weight. This growth was in the hypopharynx instead of the epipharynx, which would have been more appropriate to the discussion of Dr. Norcross' paper, but still he thought the case of interest.

(On April 19, 1916, a section of the growth was examined microscopically and pronounced squamous celled carcinoma.)

Two Wassermann tests were negative. The sputum examination for tuberculosis was negative. An attempt was made to put the esophagoscope, but was unsuccessful, as the growth had invaded the esophagus. There is no intralaryngeal involvement manifest (April 19, 1916).

Dr. Charles M. Robertson did not know that cases of malignancy of the nasopharynx were so rare as Dr. Norcross said. The paper confined the subject to growths of the pharynx itself, without considering the sphenoid sinus, and so he supposed that growths on the posterior septum would be barred. The growths that are common in the nasopharynx are fibromas,

and whether fibromas are malignant or not, he did not know, but most of those he has seen were. He has seen quite a number of growths in the throat, in the lateral wall, but nearly all of them were extensions from the sphenoidal sinus. He has had one classical case that would come under this head, which Dr. Sonnenschein also saw, which was a fibrocarcinoma, with a recurrence in the larynx. Laryngeal fissure and an exenteration of one side of the larynx produced a cure. This case is old enough now to warrant saying that it is probably beyond recurrence, as it was operated upon six or seven years ago.

He has had two cases within the month of tumors of the nasopharynx that he could not say were malignant, but he thought they were. As yet he has not received the report. One case sprang from the roof of the pharynx. It was about the size of a medium sized potato, in which the soft palate was pushed almost halfway to the incisor teeth. The patient was a boy of ten or eleven years. He thought examination would prove it to be a fibrocarcinoma or a myxosarcoma.

In the other case the attachment of the tumor was immediately behind the septum, in the nasopharynx.

He did not understand why there should be very many tumors in the side wall of the pharynx unless the tonsil was involved. There is nothing on the side wall of the pharynx except the superior constrictor muscle and a little lymphoid tissue. He had exhibited to the members several years ago a lymphosarcoma that commenced in the tonsil, and rapidly involved the side wall of the pharynx, including the lymphoid tissue around the eustachian tube. That kind of case is not particularly rare. The tumor was encysted. Lymphosarcomas are quite often encysted. That patient was referred to him by a general surgeon, who did not like the looks of it, and so sent it to the speaker. He imagined the surgeon was afraid the patient would die under the operation. In taking a piece of the tumor out for microscopic examination, he found the mucous membrane seemed to be distinct, and the tumor absolutely yellow in color, so that when the time to operate arrived, all that was necessary was to slit the mucous membrane and shell the tumor out with the finger. It only took a moment or two. The tumor extended up between the mouth of the eustachian tube on the side wall, and involved the tonsil, not as a tumor of the tonsil, but included it. The tonsil seemed to be taken

in by the tumor. A difficulty that arose during operation, however, was the fact that the tumor was so large that he could not get it out of the mouth after freeing it from its attachment, and he had to work it out with both hands.

Dr. Robertson thinks that probably nearly all of these tumor growths in the nasopharynx are secondary. He remembered one of the first cases a friend of his ever had, which was one of these broad-based fibrosarcomas, which was removed with a snare. One thing he wanted to point out, namely, in the removal of a growth like that in the nasopharynx, it is best done by the ecraseur, which is put on and the tumor cut off slowly, several hours being taken for the removal of the growth. There is nearly always a terrific hemorrhage, which may be obviated in this way. There is a very large blood supply to these parts, and they are spaces in which you cannot very well apply a pack, because of the situation in the throat.

Dr. George E. Shambaugh has seen one case that is quite like the one reported by Dr. Norcross. The patient was a medical student whose complaint was disturbance of hearing. The ear trouble was caused by an occlusion of the pharyngeal orifice of the eustachian tube, due to the tumor in the nasopharynx. The ear symptoms continued to be one of his chief annoyances until the end, and required frequent openings of the drum membrane in order to relieve sensations of pressure, caused by rarefaction of air in the tympanum.

Dr. Norcross, in closing the discussion, said there were many reports of sarcomas in this space, but he had confined his paper to carcinoma. What he wished to call attention to was that often there was very little to be seen when one examined the postnasal space, and the symptoms so frequently complained of were those either of deafness or enlarged glands in the neck, or of neuralgia.

Paper: A Study of the Physicomechanic Function of the Faucial Tonsil.*

By Elmer L. Kenyon, M. D., and W. T. Kradwell, M. D.

DISCUSSION.

Dr. Otto J. Stein said, as he understood the paper, it seems almost absolutely essential to the function of the palatoglossus

*See page 862.

muscle to have a tonsil back of it, and it is almost as important to have a tonsil in front of the palatopharyngeus muscle. He thought the diagrams and paper very instructive, bringing out very many interesting points, but if it is a fact that the tonsil is necessary for the proper function and activity of these two muscles, how does the doctor reconcile the fact that in cases where you have a normal retrogression or atrophy of the tonsil, where no vestige of the gland is seen, you can have such a perfect-looking, anatomically constructed throat? These cases are seen repeatedly. He could not see how that would apply to the absolute necessity of a tonsil leaning up against these two muscles. There is no doubt but what the operative interference produces changes spoken of by Dr. Kenyon. Of course, we all know that. But we should compare the results following operative work with the condition that would obtain without operation. From a practical standpoint, a great deal more is gained, from the operative viewpoint, based upon the indications for operation, than from the results of operative work—that is, minor work. Weighing the matter this way, it seems to him the objections are very slight.

Dr. George E. Shambaugh has been impressed with the marked alterations, as the result of scar formations, which occasionally follow the enucleation of the tonsils, but which produce no disturbance of the voice. The disturbance of the voice seems to be a very unusual sequel to such alterations. In one case with very large upper lobes, which extended upward between the folds of the soft palate, and were adherent because of recurring infection, Dr. Shambaugh experienced a great deal of difficulty in getting the tonsils removed. The patient suffered for some weeks from a paralysis of the soft palate, which caused difficulty not only in speaking, but in swallowing food and water, the liquids passing up into the nose. Even in this case the end results were quite satisfactory, with, in fact, no permanent difficulty whatever.

Dr. Shambaugh has always been very conservative in operating upon singers, and has refrained from operating in these cases except under rather urgent indications. In the cases of this sort which he has operated he has never had anything but a satisfactory result. Still, one never knows when

the tonsils are enucleated just how much alteration may follow from scar formations.

Dr. Kenyon pointed out the objections to a tonsil enucleation which rest upon the alterations in the pharynx following this procedure, but he does not suggest a suitable substitute for the operation. As a matter of fact, tonsil enucleation is not undertaken lightly, but is only done in cases where there exists ample justification, because of the menace from tonsil infection. Where these indications exist, the objections to the operation appear very insignificant as compared with the danger of leaving the tonsils alone. Any operation short of enucleation has so far proved entirely unsatisfactory. Cutting off the tonsils, or attempts to cut them out, leaving the capsule, are followed too frequently by an increase in the trouble to justify, as yet, the employment of such methods.

Dr. Arthur M. Corwin said that the spirit of Dr. Kenyon's paper was better than the paper. He did not wish to be misunderstood by anyone when he said that. He meant that the careful, thoughtful approach of a subject like this, in the face of ten thousand or one hundred thousand tonsillectomies, with a view to determining the different phases of the end results, is the kind of work that we want to see. From that standpoint, he thought it was a good paper. He thought that possibly Dr. Kenyon's results or final statements were a little more dogmatic, perhaps, or a little more final, than he would wish eventually to make them. In other words, he felt that Dr. Kenyon was not through with his investigation of the subject, and was not yet ready to say that the tonsil is absolutely necessary for good physiologic and good anatomic relationship, so far as these pillars are concerned. The essayist's conclusions would lead him to rather an equivocal position. The classification struck him as far-fetched, and the estimates based too much on guess-work to make the conclusions valuable.

Dr. Corwin has operated on a good many cases of tonsils by various methods. He has not been able to study the end results as he and others would like to study them. His patients have not come back to him complaining of loss of voice or disturbed function, nasal voice, faulty singing, faulty speech. He has not seen them, and he thought that was probably the experience of most of the members. It would be a very nice

thing to corral these patients and study them as Dr. Kenyon has begun to attempt to study his cases.

While Dr. Corwin has not seen any cases of impaired voice from a tonsillectomy, either among his own or following operations by colleagues, he felt that the same attitude of mind expressed by Dr. Shambaugh was experienced by all conservative laryngologists. He never approaches a patient, whose profession is singing, to do a radical operation on the throat, without mental reservation. And yet he has operated on many such, always with satisfactory results.

He does not know what Dr. Kenyon's conclusions will finally be, some years hence, but it seems to him that he must evolve a new operation, by which the tonsil mucous membrane shall be carefully peeled off, like the peeling of an orange, the tonsil shelled out, and the mucous membrane carefully sutured to the capsule and to the pillars, thereby saving the entire sinus, well filled with epithelium. But even then he would not have the tonsil, which he seems to indicate somewhat dogmatically is necessary for perfect function and perfect anatomic relations of the throat. The practical clinical experience now of many years of many observers of many cases does not substantiate the essayist's anatomic contentions.

Dr. Charles M. Robertson said that in the study of the tonsils we must necessarily recognize that there are two types of tonsils—diseased and nondiseased, if there is any such thing as the latter class. Dr. Kenyon, in his paper, which the speaker thought would do a lot of good, and which he was glad to hear, gave two thoughts. One was, as Dr. Corwin stated, that the tonsil must necessarily have a block behind it to support it, and the other, that the tonsil in its enucleation produces more or less cicatricial tissue, which destroys the function of one or both muscles. In children we find tonsils that have not been diseased particularly—there are no adhesions—and the tonsils should be removed, so that the cicatricial tissue would be at a minimum. In adults who have had recurrent attacks of tonsillitis, Dr. Kenyon must remember that these are not cases of normal tonsils. There may be a lot of cicatricial tissue there before the tonsil is enucleated, that has already interfered with the glossopalatal and glossopharyngeus muscles. We find cases even that have had necrosis of these tissues and necrosis

of the superior constrictor muscle. There are more than forty cases on record in which the necrosis has been so great that there has been aneurism and rupture of the internal carotid artery and death. In a case like that you could not expect to operate and have normal tissue afterwards in the muscle. The muscle is already weak or scarred. Of course, if there is a large tonsil, you must expect a lot of contraction. After operation is completed, you have a raw space of perhaps three-fourths inch high by two inches around on either side of the throat. If that is going to heal by granulation, there is going to be contraction, of course, and that must necessarily pull the soft palate, and must necessarily affect the glossopalatal and glossopharyngeus muscles. But here is the point: In all those cases where there is contraction after operation, there is an aftermath in the months following, in which the cicatricial tissue softens, just as any scar tissue softens.

As regards operating on singers, Dr. Robertson does not understand why men should fear it. He would operate on a singer just as soon as on anybody else, or a little sooner, perhaps. A person who has a voice that has been trained with a chunk of tonsil in it is no singer, or will not continue one. If that person can sing today, in ten years from now he will not sing. That is universal. He would like to see the men in Chicago make a point of that. The men in the East are all hypnotized with the fear that they are going to lose people's voices. Dr. Robertson has operated on dozens of singers, and they were all improved.

In many cases there are cheesy masses in the tonsil, which means an infected gland, and you can have an inflamed gland without a manifestation of hypertrophy of the tonsil, infecting the pillar, and also the muscle, and what is to prevent the muscle from atrophying, because it is an inflamed muscle? We have that in other parts of the body, why not there? He just mentioned this to Dr. Kenyon, not that he was antagonistic to him, but he would like to have him bring these points out.

It has occurred to him that it would be a nice thing if someone would evolve a plan by which a little skin graft could be planted immediately after operation.

Dr. Robertson does not believe that the present tonsillectomy

is the ideal operation. He believes, with Dr. Kenyon, that the tonsil surgery is in its infancy. However, he does not believe there is such a thing as a healthy tonsil after the age of eight or ten. We should have the tonsil all out; we should have a mucous membrane that is absolutely clean, with epidermis all around, and lining mucous membrane, so that the pillars would be free from each other. He dislikes to see the two pillars coalesced. Those are the cases that produce the voice injury, if there is any such thing. It is just as important to operate correctly on a talker as on a singer.

DR. J. HOLINGER wished to refer to two points. The first concerned the injuries to the voice after tonsillectomy. Usually these people know of some person whose voice was injured. The speaker never had a chance to verify such a statement personally. The second, the formation of a scar depends entirely upon the individual. In some patients you see, with a minimum of traumatism, an enormous scar; in others, after extensive traumatism, very little or no scar. You see that after any operation in the cavities of the body or on the surface. But the scar depends also upon the case itself. If you have a deep supratonsillar fossa, you must expect a pretty large traumatism in order to close the supratonsillar fossa. If you do not close it, you will have a pouch afterwards, where all kinds of material can gather, causing trouble again. Therefore, if it is a question of trying to save the muscle by doing an incomplete operation, or the other way around, he could not say which was the more advisable.

DR. J. R. FLETCHER said that some of the members thought the operation had not been evolved which would save all of this membrane, and he wished to say that that operation has been evolved, namely, dissection.

He thought many of the members could show throats of patients they had operated in which the scar was very slight indeed, in which the action of the anterior and posterior pillars was absolutely perfect.

By careful dissection, the membrane is saved on the posterior pillar or palatopharyngeus muscle.

Regarding the anatomy of the palatopharyngeus muscle, it does not seem to be very widely recognized that there is a portion of the palatopharyngeus which acts as a levator of the

tonsil itself. The speaker has dissected that out in autopsies and in nearly every case of tonsillectomy that he has done. That is the only muscle that is cut at all in doing a careful dissection. The palatopharyngeus muscle can be so stripped from the capsule that you can see the aponeurosis that covers it. There is a certain portion which has fibrous tissue lying between the muscle and the capsule of the tonsil.

As to the mucous membrane being deflected from the pharynx over the posterior portion of the palatopharyngeus muscle, then over the face of the tonsil, there is no such thing. The mucous membrane attaches itself to the posterior aspect of the tonsil, whether large, small or otherwise.

Regarding adhesions, the speaker does not think they are necessary, if a strict, rigid technic is followed. He believes the tonsillar fossa can be preserved, and the function of the muscles preserved also.

DR. KENYON, in closing the discussion, said that the function of the faucial muscles is probably dependent altogether more upon the capsule than upon the lymphatic tissue.

Permanent impairment of the speaking voice does occur from tonsillectomies. Some of the physicians in the room seemed to doubt it. Such impairment may turn out to be more frequent than we presume.

Again: It seemed to him that there was no reason why we should have an exclusively radical attitude toward the tonsil. What we need is a conservative attitude as well as a radical attitude, and it is for us to work out a conservative attitude for conservative cases.

The question as to the singing voice opened up such a large field that he would not then, at so late an hour, touch on the subject at all.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of April 18, 1916.

DR. OTIS H. MACLAY, THE PRESIDENT, IN THE CHAIR.

Case of High Degree of Retraction of the Posterior Half of the Drum Head as a Consequence of Old Adenoids.

DR. J. HOLINGER demonstrated a boy, M. H., sixteen years old, who complained of hard hearing, dizziness and noises in both ears for the last two years. Neither ear ever discharged. Large quantities of ear wax and epidermoidal scales were removed from both ears, especially from the right, where they were anchored in the region of the posterior upper quadrant of the drum membrane. Both membranes were considerably retracted. Hearing distance in the right ear was one meter for whisper; in the left, three meters. In catheterization the air entered with a soft sound in the right, with a harsh (normal) sound in the left ear, after which the aspect of the right drum membrane was as follows: The anterior half is normal, the posterior half shows the highest degree of retraction. The membrana flaccida shows the reflex of a cove. The handle of the hammer is in its normal position, but the posterior half of the membrane is tightly adherent to the inner wall of the middle ear. The short process is quite prominent, and a high posterior fold extends from it, sickle-shaped, to the posterior margin. Depressing the speculum downward and forward, one is able to look underneath this fold into a bag-shaped excavation of the membrane, extending into the aditus ad antrum. On the inner wall of this bag the long process of the incus, the stapes, and, extending horizontally backwards, the tendon of the stapedius muscle are clearly visible. The atrophic adherent part of the membrane is drawn tightly, like a glove over the hand, over all these parts. The left membrane is normal.

Considerable masses of adenoids and the tonsils were removed. Hearing improved in both ears—in the right to four

meters, in the left to over seven meters for whisper. Rinne's test: a^1 right ear plus ten seconds, left ear plus twenty seconds. Weber-Schwabach: a^1 in the right ear positive; a in the right ear plus twenty seconds. The lower tone limit in the right is 26 v.d.; in the left ear, 16 v.d.

Explanation.—There is in the right ear one of the consequences of adenoids. Through absorption of air in the antrum and cells of the mastoid, the membrane became first retracted, then in the posterior half adherent, and extended bag-shaped into the aditus ad antrum, thus overlapping and later on replacing the normal lining by epidermis. Masses of epidermis gathered in the bag, and there is the beginning of cholesteatoma. The most forcible inflation through the catheter gives subjective relief, but does not change the picture. Had the speaker had a chance to remove the adenoids a year or so ago, normal conditions might have been obtained, as secured in the left ear. Now the boy is a chronic invalid.

DISCUSSION.

DR. GEORGE E. SHAMBAUGH asked Dr. Holinger whether he considered the condition of the drum membrane the result of reaction alone.

DR. HOLINGER replied in the affirmative.

DR. SHAMBAUGH said that the impression he got from the appearance of the drum membrane in this case was that of scar formation in the upper posterior quadrant. The most extreme form of retracted drum membranes which one encounters in the nonsuppurative types of middle ear troubles presents a condition where the handle of the hammer is entirely obscured, drawn up under the posterior fold. In Dr. Holinger's case the manubrium is still visible. The formation of a cholesteatoma in the pocket formed in the upper external margin of Dr. Holinger's case is the most interesting feature, and throws an additional light on the method of formation of this interesting clinical condition. It is apparently always due to the accumulation of desquamated epithelium and develops, as a rule, from epithelium which has invaded the middle ear cavities. Dr. Shambaugh has seen a large cholesteatomatous mass filling the inner third of the external meatus, where there has been no perforation into the middle ear.

Dr. Holinger's case resembles rather closely the cases of cholesteatoma developing in the attic, the origin of which has been cleared up by the work of Bezold. The membrana flaccida is very often sucked in against the neck of the hammer, to which it becomes adherent. It becomes very easily torn, and in this way forms a portal for entrance of epithelium into the attic. This eventually results in a cholesteatomatous formation.

DR. NORVAL H. PIERCE thought the case very interesting, the pathology of which has to do with the very keynote of the pathology of the middle ear. His understanding of the process of formation of cholesteatoma in this type of cases, as described by Bezold, is that the eustachian tube becomes closed. He asked Dr. Holinger if the tube was permeable in the case presented.

DR. HOLINGER replied that it was.

DR. PIERCE asked if he could see the location of the adhesions.

DR. HOLINGER replied that the anterior part of the membrane is covered, but not the posterior.

DR. PIERCE said that Politzer claims that in all these cases there is an absolute shutting off of ventilation from the part of the ear affected—not necessarily in the eustachian tube, but somewhere in the cavum tympani, so that no oxygen gets into that portion of the cavum; whether in the tube or whether due to adhesions somewhere among the various ligaments of the epitympanic space and the tubal ostium, makes very little difference. The fact remains that there is no ventilation or no ingress of oxygen to that particular part of the cavum which is affected. As the members all knew, the theory is that the oxygen is absorbed and carbonic acid given off by the mucous membrane in the cavum. It is well-known that carbonic acid is a great stimulus to muscle fiber, and probably in these cases this surplus carbonic acid contributes to the abnormal contraction of the tensor tympani, adding to the retraction of the tympanic membrane. There are two entirely dissimilar otoscopic pictures presented by these cases: One in which the manubrium mallei is in an approximately normal position as regards its lateral relations, the other in which the manubrium is greatly foreshortened, or scarcely visible, in advanced cases, it

having been retracted inwards and upwards toward the eustachian tube orifice. The explanation is this: In the former cases the manubrium has been at the very beginning of the process bound down to the promontory by a plastic inflammation, rendering the lateral dislocation impossible. In the latter cases no such adhesion has occurred, so that the plus atmospheric pressure outside of the tympanic membrane and the contraction of the tensor tympani has been unrestrained. Cholesteatoma are more likely to form in the former class of cases. Atmospheric pressure remains the same in the external auditory canal —sixteen pounds to the square inch—and this pressure produces pressure atrophy. Pressure atrophy has its greatest effect on the least resistant portion of the membrane—Shrapnell's membrane. Shrapnell's membrane is composed of two layers, the skin and the mucous membrane, whereas the pars tensa is composed of three layers—the layer from the dermis of the external auditory canal, the middle or fibrous tissue, and the layer derived from the mucosa of the cavum. Therefore, the pressure atrophy has its greatest effect upon Shrapnell's membrane.

Before cholesteatoma can occur in these cases we must have a perforation, which perforation occurs in Shrapnell's membrane as an end result of pressure atrophy. After perforation occurs, then the epithelium from the external auditory canal and the tympanic membrane crosses through the perforation and into the aditus and epitympanic space. These are the cases of adhesion in these early stages that recently have attracted attention—in New York especially. It has been claimed that considerable benefit as to hearing is derived from mobilizing the handle of the malleus from the promontory. An incsiion is made below the long handle of the malleus, and with a ring encircling the malleus the adhesions are broken up. We all know that this is only a small part of the pathology of such a condition. Dr. Pierce's experience has led him to believe that it is impossible permanently to mobilize these cases, and in cases of threatened cholesteatomatous formation it is a question in his mind whether ossiculectomy is not advisable, to prevent the formation of cholesteatomatous masses up in the antrum. He has been able to remove the cholesteatoma in a couple of instances by injecting salt solution under the periosteum of the

external auditory canal. There is usually a break in the periosteum that covers the outer surface of the epitympanic space, and this fluid apparently travels under the periosteum of the external auditory canal into the epitympanic space, and then washes out the cholesteatoma through the perforation. In one case, at least, this method was followed by an apparent cure. In other words, the cholesteatoma did not return for a considerable time afterwards.

These cases are very elementary, but very practical, and the speaker was glad that Dr. Holinger had brought the case before the society.

DR. HOLINGER, in closing the discussion, said that the difference between the condition present in his case and that reported by Dr. Shambaugh is in the fibers of the membrane extending downward and forward from the end of the handle of the mallet. If these fibers are strong enough to withstand the traction of the tensor tympani muscle, the handle of the mallet will remain in place; if not, or if there is a perforation of the light cone, the handle will move upward and backward. In his case these fibers saved the anterior half of the drum head. The posterior half became retracted, atrophic, adherent and formed what Bezold called a "cholesteatoma of the external meatus."

Paper: Massage of the Eustachian Tube.*

BY ALFRED LEWY, M. D.

DISCUSSION.

DR. J. HOLINGER thought a paper of so much importance as that presented by Dr. Lewy should not go without discussion, especially at the present time, when we actually see so many of these cases. The epidemic of influenza of last winter was combined in a great many cases with middle ear suppuration and affection of the eustachian tubes. Many of them belonged to the category spoken of by Dr. Lewy, with more or less retraction of the drum head, and very distressing subjective noises. The speaker did not know whether the other members saw as many of such cases as he had, but it seemed to him that sometimes for days he hardly saw anything else

*See page 898.

except secondary changes in the tube and middle ear, caused by chronic or subacute nasopharyngitis. He had not had the courage thus far to massage the tubes directly, although the indication was present. The question in his mind has always been, is it probable that we accomplish more in these cases by an active treatment than by waiting? Therefore, he welcomed the paper. It showed that with the careful technic described in the paper, Dr. Lewy did not see very much result, and the other members need not expect much more from their endeavors. The socalled stenosis of the eustachian tube has been discussed very extensively. The Schwartze school insisted on using the bougie in the eustachian tube. Bezold has shown that there is a curve in the eustachian tube. This curve is sometimes very sharp, so that a bougie may get caught, and not pass. This does not necessarily mean a stricture. The pathologic changes of the eustachian tube are not in the course of the tube, but at both ends, either at the tympanic end or at the nasopharyngeal end. The nasopharyngeal end can be reached with Dr. Lewy's method, often with good success. The work that has been done so far with the nasopharyngoscope is very promising of further success.

Dr. Joseph C. Beck said that a few years ago, when he began to examine the eustachian tube by the present nasopharyngoscope, then known as the Valentine salpingoscope, he saw a recess behind the posterior lip of the eustachian tube that was never visible to him before. At that time Dr. Pynchon told him that he had been practicing what he called massage of the eustachian tube and the lymphoid tissue which he found in that region. But for the last three years, since the speaker pulled forward a palate in the adenoid operation, he has frequently seen the socalled Rosenmüller fossa and the posterior lip, a condition that was never clear to him by any mirror examination.

After acute or chronic inflammation of the nasopharynx there is an infiltration in the muscles of the tube, so that the normal action does not take place, and then by this massage action, sweeping around these three different strokes, normal action may be brought about. Too little attention is paid to the eustachian tube, particularly to the muscular apparatus of the tube.

He thinks that the result oftentimes obtained by the removal of the tonsils is due to the change produced on that little muscle, which comes from the palate, that goes around the eustachian tube opening. Hence the parts have again reestablished themselves.

Massage in these chronic cases improves the condition temporarily, but when left alone the condition returns. The result is on the muscle apparatus more than anything else.

DR. H. KAHN said the question of massage of the eustachian tube is not new. The method described by the essayist is novel. Ten or twelve years ago Urbantschitsch massaged the eustachian tube by passing a eustachian catheter; through this a celluloid bougie was inserted, and then with a backward and forward movement of the bougie five, ten or fifteen times, as desired, hyperemia was established, and adhesions were also broken up. Urbantschitsch also practiced a backward and forward massage of the nose, with a mechanical vibrator, which reached back around the end of the tube through the length of the lower meatus of the nose. This vibrator was armed with cotton and an oleaginous substance, and rubbed the lower end of the turbinate. Dr. Kahn could not see that the method does anything more than establish a hyperemia, or to make a postnasal application in a definite way.

DR. ROBERT SONNENSCHEIN, in closing the discussion for Dr. Lewy, said he hardly felt in a position to discuss the paper. He knew that some men have practiced massage of the eustachian tube on the same principle that pneumomassage is applied to the external ear—by passing a catheter into the eustachian tube, and then applying the tip of the apparatus which transmits the pneumomassage to the end of the catheter, and massages in that manner.

Whether the efficacy of all these methods is due to the fact that a hyperemia is induced, or whether the exercise of the muscles, as suggested, is the prime factor, he did not know, but thought that perhaps both had something to do with it.

The fact mentioned by Dr. Beck regarding temporary improvement of hearing after removal of tonsils and adenoids is probably seen by many. Nothing has shocked the speaker more than to see a wonderful improvement of hearing after removal of the adenoids, and then, a year later, retrogression

again. Whether this was due to the fact that a small amount of lymphoid tissue is left in the fossa of Rosenmüller, or to the fact that the muscles have renewed their former tone or lack of tone, he could not say.

Paper: Difficulties and Complications of Sphenopalatine Ganglion Injection.*

By Harry L. Pollock, M. D.

DISCUSSION.

Dr. Robert Sonnenschein said that, while he has never injected the sphenopalatine ganglion, he wanted to report a very interesting and absolutely typical case of the syndrome described by Sluder. In this case there evidently was a dehiscence of bone covering the ganglion, because the ganglion responded to treatment in a way that showed that it must have been exposed. The patient, thirty years of age, a married woman, came to the speaker about three years ago, and, without suggestion or direct questioning on his part, gave a history of the typical symptoms of the syndrome of Sluder. There were most terrific neuralgic pains, starting in the region of the cheeks, going into the mastoid, down the occiput, shoulder and into the arm. In order to relieve this, various dentists had removed all of the upper teeth, without benefit. Twice a week she had such severe paroxysms that she was obliged to stay in bed, and any exertion, such as going down town, invariably brought on a paroxysm. Having heard Sluder about a year or two before that describe the condition, the speaker at once connected the two, and on going up beneath the middle turbinate bone with the posterior end of a small applicator and touching this region, a most frightful paroxysm was brought on. He then used a saturated cocain solution, as suggested by Sluder, and in a few minutes relief was obtained. He then used formalin two or three times a week for six or seven applications, beginning with one-tenth of one per cent solution. The paroxysms diminished and then disappeared, so that for two years she was practically free from pain, except for very slight occasional pains which did not incapacitate her. Two or

*See page 958.

three months ago she returned, with the statement that she had one or two paroxysms, which, however, were nothing compared with the original ones. Dr. Sonnenschein then applied the formalin again for a few treatments, and the pains disappeared.

This case had the typical symptoms and yet yielded to these simple topical applications. There was no hysteria present in the case, but a sad reality in the removal of all of the upper teeth in a young woman of thirty, for a condition which was not benefited by their removal.

DR. H. KAHN said the whole question under discussion was of much interest to him, particularly the mechanism of cocain when applied in this region—the posterior end of the middle turbinate—and about the region of this ganglion. What is the mechanism? Why does the cocain act? There must be some intimate connection of the outside with the inside.

DR. BECK said that they had obtained results in other cases, but those were the best where the cocain was used.

DR. KAHN said he would like to know the mode of action of the drug.

DR. NORVAL H. PIERCE said he had had very little experience in this matter. He had had some, however, and had seen Sluder work. One of Sluder's cases he remembered, of a physician who had to give up his work for a long time on account of this pain running down into his right arm. This man told Dr. Pierce himself that he was cured, the cure coming on after the second or third injection of his sphenopalatine ganglion. He also saw a case of nervous affection of the eyelids injected by Sluder, and Sluder afterwards wrote him that the case had been entirely cured up after a week.

The speaker had had one case that he rather hesitated to say anything about, because he was quite sure he did not get into the sphenopalatine ganglion. This patient, a man, was a highly nervous and imaginative individual. He suffered from ethmoid disease and the arm pain, which was not neurotic in character, however. He would describe it by saying that a numbness would start in his face, and then a sensation like the buzz of an electric bell would seize him over the collarbone; this would be followed by numbness and sometimes pronounced pain running down the arm. Dr. Pierce told this man

that he had recently seen cases of that sort treated, and that if he would consent to the experiment, he would be glad to try this method of treatment. The man readily agreed to it, and Dr. Pierce tried to get into the sphenopalatine ganglion. The patient had a very open nose, and he could see his way very distinctly. He put all the pressure that he thought was justified on a very heavy needle and tried to get in. He was quite sure, however, that he did not get beyond the periosteum. However, a week afterwards the man came back and said that he was greatly improved. The telephone bell effect had disappeared, and all he had was a slight constriction around the left forearm, and he insisted on another injection, which Dr. Pierce did, in the same manner, in the same dense bone. In another week the man reported that he was practically all right, and was greatly pleased. Dr. Pierce did not feel that he could ascribe the effect to the injection of the ganglion.

One thing he wished to speak of, however, was that there was quite a copious initial hemorrhage.

All these cases of vague pain in the head, and strange abnormalities of vision are almost always connected with instability of the nervous system, which, on this account, are probably often benefited by any extraordinary method of operating. We should go very carefully about this whole matter before drawing fixed conclusions.

Dr. Louis Ostrom, Rock Island, said he had seen Sluder work, as well as a few others, and had seen what he considers a neglect of detail of technic that is not permissible in other work, namely, leaving air in the needle. Air is left in the needle to the amount equaling seven drops of water. Unless this air is expressed and the needle filled with the solution to be used, you are injecting air first. He has seen trouble following the use of sphenopalatine injections, and he felt it was due entirely to this neglect. His method is to fill the needle with the solution to be used and then cork one end. The needle is then introduced, syringe (already filled) attached, and he knows how much he is injecting. He thinks that is just as important in this connection as in giving an ordinary hypodermic, if not more so. It is all a matter of technic.

Sluder has his patient in the upright position. It is not an easy matter to make an injection, with a movable head, and

know just exactly the force that you are applying. If you have the patient in the recumbent position, then make the injection, you have absolute physical control of the situation.

Dr. Ostrom believes these two points are just as important in the technic as the location. When you say the posterior tip, he believes that that also should be restricted as to what is meant by the posterior end of the middle turbinate, because you may have a very large tip of the posterior end, and unless you keep the exact location of the sphenopalatine ganglion in mind, you may go wrong.

Dr. Joseph C. Beck thought the most important part in the cases that were reported is the effect of the alcohol on nerve tissue and on the neighboring nerves. The sphenoidal fissure and the pterygomaxillary fossa are in close proximity, and so is the sphenoid sinus, to a number of nerves, particularly the optic nerve. He believes these injections are made very frequently without any regard to vision. That is, the vision is not taken before or after these cases are injected, and the question is to be answered as to what effect alcohol has on the various nerves. Dr. Norcross presented a paper to the society on the injection of the superior laryngeal nerve, in which he reported hypoglossal paralyses or paralyses of the tongue, and Dr. Beck has had such an experience, and we have heard about the abducens paralysis. In this injection of sphenopalatine ganglion the optic nerve gets a bath of alcohol—at least, the adventitia of the optic nerve does—and it is yet to be proven what the effect of the alcohol is on the optic nerve. We know the hypoglossal and abducens could be affected. He wished to report a case of facial paralysis following the use of trichloracetic acid. He completed a radical mastoid operation, in which he had previously closed the pharyngeal end of the tube, and got a complete closure of the tympanic membrane in a case of continuous discharge from the ear. The perforation healed up, but soon after that there were recurrences of fluid accumulation in the ear, with typical attacks. Rupture ensued; then the patient was well for several months. Then there was a good deal of pain in the mastoid. The speaker opened up and did a radical mastoid. In order to end the trouble he used Yankauer's curette, and then with a Holmes' applicator very carefully applied the trichloracetic acid into the tube to

further insure obliteration, but undoubtedly must have spilled some of the trichloracetic acid in the region of the facial canal, or in some dehiscent portion of it. At any rate, the patient had a transient facial paralysis, which took only a short time to recover. The facial nerve might have been injured during the mastoid operation, but he doubted it. He took it to be a case of facial paralysis from trichloracetic acid, analogous to the action of alcohol.

Dr. Beck could say frankly that the results from these injections are uniformly poor. They are not lasting. Many of them are failures, especially those that are done for vague pains in the head. Quite a few have been benefited, but striking results, such as he has heard reported by others, he has not seen. The condition is apt to recur, because you do not get a destruction, as in the use of osmic acid. There is only a temporary destruction of the neurons, or part of them, which is followed by a reformation of the structures.

The question of hemorrhage is, of course, important. We must be careful not to injure that branch of the posterior pharyngeal that goes down in close proximity to the sphenopalatine ganglion. In one case the speaker injected the ganglion in a patient, and a week later the alarming hemorrhage occurred. She had had some bleeding at the time of operation, but this hemorrhage must have been due to secondary infection.

Dr. J. Holinger had made several of these injections, and could only coincide with the other speakers. The results were not as he had expected. He especially recalled one patient in whom he injected the sphenopalatine ganglion three times, at intervals of five weeks. The symptoms were typical. He was sure that he followed the technic to the very letter. There was no benefit derived by the patient. He had had the same experience with the two other cases he had injected.

Dr. Pollock, in closing the discussion, was glad to hear so much adverse criticism, but wished to call attention to a paper, previously read by him, in which he had stated that the results were not as brilliant in his hands as those reported by Sluder, and that was his reason for reporting his failures, so to speak. However, he has had some good results. Uniformly, the results have not been so good as he would like them to be,

but he could not quite agree with most of the men, because he has in a great number of cases obtained good results.

In regard to Dr. Kahn's question as to why the application of cocain in this region results in temporary cure of the patient, or relief of symptoms, he wished to say that the cocain has a very strong penetrating effect on mucous membrane, and the sphenopalatine foramen is right in that neighborhood. He tries to put the cocain up against the sphenopalatine foramen. There is an opening in the bone in the posterior wall, and there is nothing but a little mucous membrane to penetrate through.

DR. KAHN asked if Dr. Pollock got the same result in thick bone.

DR. POLLOCK replied that there is a sphenopalatine opening in the foramen in that region, where the nerve comes out—the nerve that supplies the mucous membrane of the turbinals; the cocain is applied in that region, and it penetrates.

Sluder has also advocated applying a solution of salicylic acid and various other medicaments that penetrate and have effect on these nerves. That is the reason we get these results. In all those cases where instantaneous relief is experienced, the results have been good.

Dr. Pollock did not wish to be understood as saying that when a patient comes with these pains, the sphenopalatine ganglion is injected immediately. That was not the idea of the paper.

He referred to a case he saw in consultation with a doctor from St. Louis, which was one of typical sphenopalatine neuralgic pain. This doctor had diagnosed the case, and had had an X-ray picture taken, which showed that the third molar was impacted, in a young lady, about twenty-three years of age. He advised removal of the tooth, but she objected to it. They brought her to Chicago, and Dr. Pollock saw the young lady, and he also advised removal of the tooth. This was done, and immediately all the symptoms disappeared. It is the same way when there is a suppurative ethmoiditis or sphenoiditis causing irritation of this ganglion. All points of irritation are removed first, and if nothing results, then resort to the sphenopalatine ganglion injection. It is a sort of a measure of last resort.

With regard to Dr. Ostrom's remarks about the head being

movable, the speaker always has a nurse to support the head. In very difficult cases he gets a hammerlock on the patient. A great deal of force has to be used in most of these cases, because the bone is sometimes so thick that even with a hammer you cannot drive the long needle into the bone. Dr. Sluder reported one case in which he actually drilled through into the pterygomaxillary fossa, and curetted out what he took to be the sphenopalatine ganglion This is the only case of drilling on record in this operation.

Dr. Pollock does not think there is any danger of using too much pressure, because you can feel that by your pressure sense. It is just the same feeling as in penetrating an antrum. Of course, the bone is thicker in most cases than the antral wall, but you can feel the needle slip into place.

In regard to Dr. Beck's remarks about the effect of alcohol injection upon the different nerves, the sensory and motor as well as the optic, the speaker had had no experience in this line. Otto May of London reported his results in the *British Medical Journal.* He injected alcohol in from fifty to ninety per cent strength, using from one-half to three-fourths centimeters, and injected into the supraorbital, Gasserian ganglion, the sciatic and anterior crural nerves in cats and dogs. He experimented on from seventy-five to one hundred animals, but arrived at the conclusion that alcohol injected into the trunk of a peripheral nerve produces a more or less local necrosis of the nerve at the point of injection. The degeneration that occurs is not an ascending one anywhere. The nerve above the point of injection remains normal. The cells at the origin of the fibers may show some degree of chromatolysis, but do not exhibit signs of permanent injury. The condition produced by such injection is more favorable to regeneration than that resulting from simple section. That is, by the injection you get earlier regeneration than from injection without suturing the nerve again. The rapid regeneration of the nerve is retarded somewhat by the fibrosis which occurs, to a greater or less extent, in every case of alcohol injection.

About the Gasserian: It is apparently impossible by a single injection of alcohol to produce complete necrosis of the Gasserian ganglion, its dense texture preventing complete infiltra-

tion. Alcohol tends to find its way underneath the sheath of the ganglion to the proximal root, which is affected to a greater degree than the actual Gasserian ganglion cells. There is a regeneration that occurs even after injection of the sphenopalatine ganglion. That is why some cases that are injected seem to have good results, and after a period varying from six months to two years they return with the same symptoms to a mild degree. They are reinjected, if necessary, two or three times. One patient the speaker has injected five times. Once you strike the ganglion, there is no use injecting further. The ganglion is a very small particle of the nerve tissue, situated in quite a large fossa. It is not very often that the speaker has struck it the first time. If you inject the alcohol and it permeates around, it does not affect the ganglion the same as if the needle went directly into the ganglion, which is demonstrated by the excruciating pain. When the ganglion is struck, uniformly good results are obtained, but the results are not as good as expected, nor as good as Dr. Sluder claims. However, Dr. Pollock said that there have been a large number of cases where relief from the pain was experienced. Of course, all cases of hyperesthetic rhinitis got relief, and a large percentage of the cases of neuralgia were benefited.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting of May 22, 1916.

DR. OTIS H. MACLAY, THE PRESIDENT, IN THE CHAIR.

Case of Increasing Loss of Hearing—Left-Sided Facial Paralysis—Hoarseness—Tumor in Right Parotid Region—Hemiatrophy and Paresis of Left Side of Tongue.

DR. NORVAL H. PIERCE demonstrated the case of a man, aged sixty-one years, who consulted him because he was getting hard of hearing on the left side. Tuning fork tests: Left—Weber-Schwabach, twenty-five seconds, lateralized to the left ear; Rinne, ten seconds osseous conduction, and twenty-seven seconds aerial conduction. Right—Fifteen seconds osseous conduction, and forty-five seconds aerial conduction. Low tone limit on both sides, G^2 (twenty-four vibrations a second). High tone limit on both sides decreased. The high tones on the left more decreased than the right. Whisper heard on left side at four to twelve inches, including high and low pitched words. Right, ten inches to three feet. The same type of disease is present, therefore, in both ears, a type that has been named by Bezold as dysacusis—both the middle and internal ears being involved. The speaker found a facial paralysis on the left side, and a tumor in the right parotid region, which tumor was immovable from the deeper structures. Only the skin was movable. The tumor was hard and somewhat nodular. The tongue showed a hemiatrophy on the left side, and in projection was directed to the left side. The man complained of hoarseness, and on examination it was found that he had adductor paralysis of the left vocal cord.

Dr. Pierce's analysis of the case was as follows: The tumor is in all probability the socalled mixed tumor of the parotid, which is a very curious kind of tumor, affecting the parotid and the submaxillary glands, most frequently the parotid—about seventy-one per cent parotid, and the rest submaxillary.

In the early stages such tumors are movable within the parotid tissues. It is hard or soft, according to its composition; is somewhat nodular and covered with well-pronounced limiting membrane or capsule, from which capsule strands of connective tissue are thrown into the tumor tissue, forming lobules. The microscopic character of the tumor has been the source of a good deal of controversy, some claiming that it is derived from the connective tissue elements, others that it is derived from the endothelium or epithelium elements. Inasmuch as these tumors contain fat, cartilage and sometimes bone, the speaker believes that the school represented by Volkmann, which holds that they are of embryologic origin, is correct. The peculiar histology is this, that the tumor proper is composed of cylinders formed of epithelial or endothelial cells, columnar in character. The embryologic displacement theory is substantiated in this particular case by the fact that some time ago the man had a tumor removed from the neck, which the surgeon told him contained hair—in other words, a dermoid, which is derived from an embryonal matrix.

The facial paralysis is due to involvement of the facial nerve on that side by the tumor. The hypoglossal involvement is due also to involvement by the tumor, as the nerve passes down the retromaxillary fossa. The tumor has nothing whatever to do with the nerve of hearing or the hearing apparatus, other than that it is encroaching upon the external auditory canal and closing it up. It is scarcely possible to see the tympanic membrane on that side. This opinion is further strengthened by the fact that the same type of disease is present on both sides.

The facial paralysis is not due to anything going on within the temporal bone proper, but is due to a peripheral involvement of the tumor, which is proven by the fact that the palate is not involved. The glossopharyngeus is not involved, but the hypoglossus is involved, which is due to invasion by the tumor of the retromaxillary fossa.

The disease of the larynx is an entirely different affair, and is in all probability due to some trouble within the thorax, although a somewhat superficial examination did not disclose anything wrong in the way of a large aneurism.

The Wassermann in this case is negative. The man disclaims any venereal disease.

In the speaker's opinion, the treatment of the tumor is of little value. In all probability, it is undergoing a malignant change, as such tumors are very liable to do. When such change takes place, there is very little to be done, in a surgical way. Possibly X-rays could be tried. The type of hardness of hearing present in this case is uninfluenced by treatment.

Case of Previously Existing Ethmoid Labyrinth Suppuration With Polypoid Tissue, With Probable Invasion of the Orbit by a Malignant Process.

DR. NORVAL H. PIERCE: This patient is fifty-six years of age. Five and one-half months ago he was held up and struck on the head. He has a discharge from the left side of the nose, with symptoms of nasal stoppage. After the trauma a neuralgia developed in the upper and lower branches of the fifth nerve, which was especially marked over the frontal division of the nerve. Ten weeks after the injury he had an operation on the supraorbital nerve, when it was dissected out from the supraorbital foramen. For a time following this operation he was better. Then the pain recurred, and at the present time is as bad as ever. Gradually double vision developed, so that at the present time he sees double when the object is downward and to the left. In examining his eyes and making them go through their excursions, it appears that the inferior oblique is involved. The eyeball is slightly raised above its fellow. There is an enlargement over the left cheek (malar bone).

Examination of the nose reveals polypi, which have been removed several times. Their removal was accompanied by a very profuse hemorrhage.

The question is, what has occurred to this man? He evidently had the ethmoid disease long before the accident. X-ray examination shows that there is a shadow in the region corresponding to the left frontal sinus, left maxillary sinus and left sphenoid. Is it a case of malignant growth beginning after the injury to the skull? Is it an inflammation of the structures of the orbit from the previously existing ethmoid disease, or is it a hemorrhage at the base, which has come on after the

injury or at the time of the injury, and is now just becoming organized and causing pressure on the nerves at the base?

Examination of the tissue taken from the nose showed nothing malignant.

Dr. Pierce's diagnosis is this: Previously existing ethmoid labyrinth suppuration, with polypoid tissue, and a very strong likelihood that there is an inflammatory or malignant process now invading the orbit. It is not possible to differentiate very well by the nerves involved, inasmuch as the superior branch of the third nerve accompanies the ophthalmic branch of the fifth. If it were the superior oblique, we could say that an inflammatory condition in this region could very easily involve both of these nerves, but if he is right in believing that it is the inferior rectus, then that nerve is situated at some distance from the ophthalmic division of the fifth. It would require quite a good deal of area to be covered by any process whatever to involve both of them, and there would be vastly greater local evidence of involvement of the orbital structures. This would suggest, to his mind, a malignant rather than an inflammatory trouble.

Glaucoma might be thought of also. The tension of both eyes is about alike, however. The eye grounds are normal.

This case should be very carefully weighed before attempting to do anything in the way of an operative procedure. However, Dr. Pierce is of the opinion that whatever is done should be done externally.

DISCUSSION.

Dr. H. Kahn said that the second patient had come to see him about two months ago, having just previously consulted Dr. S. Kuh, who could find nothing neurologic except the involvement of the fifth nerve. Dr. Kahn sent the man to the hospital, where a large number of very large polypi were removed. After the first sitting the hemorrhage was quite profuse, enough so to be very alarming. He was kept at the hospital for a day or so, and the symptoms apparently improved—the headache got better, and he could read a little bit. He did not have double vision at this time, and did not tire so much on reading. A day or so after the first operation, Dr. Kahn took off a piece of the middle turbinate anteriorly and opened up the ethmoid, which was immediately followed by

a great gush of pus. Following this there was quite a disconcerting hemorrhage. Then the man was let rest again. From day to day, in the course of a week, the speaker tried to clean up the ethmoid. When the man left the hospital the pain and double vision had disappeared and he was fairly comfortable. During this time Dr. Snydacker examined the eye, and Dr. Kahn was of the opinion that a diagnosis was made of superior rectus involvement and beginning glaucoma in both eyes, with a cupping of the discs. When Dr. Kahn had the man under his care there was not such a pronounced proptosis as at present. His pain was relieved by a little aspirin, or some mild coal tar derivative, and he was kept fairly comfortable in this way. Of one thing Dr. Kahn was pretty sure, namely, that there was no malignancy reported. X-ray taken at that time showed substantially the same as that taken by Dr. Pierce. Puncture of the antrum was negative, and the frontal sinus findings were also negative on washing out. So far as could be made out, the whole thing most likely lay within the ethmoid. What the exact condition is, he could not say.

Dr. Robert Sonnenschein said that at the request of Dr. Kahn he had had the privilege of seeing the second patient, and also saw the X-rays. He had simply examined the man's nose, without cocaining him, and felt that it was a question for further investigation. But, as Dr. Pierce had said, if anything were done in the way of radical procedure, an external operation would probably be the thing desired.

Dr. J. Holinger, regarding the first case demonstrated, asked as to the condition of Steno's duct. He wondered if there was any abnormal discharge or composition of the saliva.

Dr. Pierce said the discharge was no more than normal. It had not been examined chemically.

Dr. Holinger, regarding the second patient, asked as to the condition of the nasopharynx. He thought it would be a favorable case in which to make the examination of the postnasal space demonstrated in Champaign. If Dr. Kahn could do so, he would like to have him tell the society whether there had been any progress of the condition.

Dr. H. Kahn said there seemed to be more enlargement; at any rate, it seemed to him that there was more proptosis than when he had seen the man before.

DR. MACLAY asked as to the condition of the nose at the present time—whether there was any return of the former condition.

DR. KAHN replied that he had not examined the man for some time.

DR. PIERCE said there was a return of the ordinary mucous polypi.

DR. PIERCE, in closing the discussion, said that all knew that a sarcoma or carcinoma of the ethmoid cells may be accompanied by the ordinary myxomatous growths that are indistinguishable microscopically and macroscopically from the growths that accompany the ordinary purulent inflammation of the ethmoid labyrinth.

(NOTE.—August, 1916, on operation, carcinoma involving the ethmoid and orbit was proven microscopically.)

Papilloma of the Right Vocal Cord.

DR. ROBERT H. GOOD showed a patient, a young girl, aged seventeen years, who had had a papilloma on the right vocal cord, which remained after several operations. The cord was thickened, especially the ventricle band, and the cord itself was reddened. When the patient phonated there was but slight movement of the cord. The patient had been in the Cook County Hospital since last September, and she had a number of operations for removal of the papilloma while there. She came to Dr. Good three months after the last operation, which was performed by Dr. Beck, and had not been able to speak above a whisper for a year. The speaker did not expect to be able to do anything, but used fulguration and sesquichlorid of iron, ten per cent. He first fulgurated for ten minutes, combined with the sesquichlorid of iron, and to his surprise one week later she was able to talk some. He has kept this up, and now she can sing.

Dr. Good learned of sesquichlorid of iron being used in this way in Edinburgh in Turner's clinic, so he thought he would try it in the case demonstrated, and certainly it has done wonders. The little papilloma has gone, and the right vocal cord moves well now.

Case of Double Dacryocystitis.

DR. GOOD'S second patient was a young woman, who came to him suffering with a double dacryocystitis. Only one side had been operated by Dr. Good. He did the Yankauer operation, removing the anterior end of the inferior turbinate. First he put in a grooved probe through the lacrimal duct, which he used as a guide, removing the inferior turbinate about a quarter inch further back than the probe. Then he chiseled the entire internal bony wall of the ostium away, and then the entire bony wall over the sac. After the bone was all removed, he took a knife and ran along the groove in the lacrimal probe. Since this operation the patient has not had the least trouble.

Dr. Good's reason for not doing the West operation is because Yankauer has brought out the point that frequently it is the bony wall around the duct, down below, that makes pressure upon it, and he says if this bony wall is removed, so that there is no more constriction at the bottom of the duct, the natural opening is reestablished. He had to say, however, that as yet if he injects argyrol through the cannula it comes out through the middle meatus. But the patient has not had the sign of epiphora on the operated side. The other side is still suppurating, as before.

Before coming to the speaker the patient had had the ducts dilated twenty-eight times, so that there was absolutely no use for further attempt along that line.

Dr. Good operated last November. He expects to operate the other side as soon as the patient wants it.

Specimen of a Little Sieve Removed From the Trachea.

DR. GOOD then showed a specimen of a little sieve which he had removed from a patient's trachea three days previously. The sieve had been in the trachea for three weeks, almost without symptoms until the last week. The peculiar thing about the case was the character of the symptoms produced by this foreign body. The child came to his office, carried by the father. She was ten years old. Pulse, 150; temperature, 99.5°, and gasping for breath. He could not understand how such a small object could produce so much obstruction in the trachea, unless it simply produced spasms. After removal of the sieve the child was entirely relieved.

DISCUSSION.

DR. OTTO J. STEIN asked Dr. Good how many applications of fulguration he had made in the first case, and also something about the technic. Fulguration has been used a great deal in these cases and discarded by many operators as of no value. He had tried it quite a few times. He did not believe he knew how to use it, as he never got any results of any value. He had seen by the literature that Yankauer is advising using it in a perfectly dry field. That seems to Dr. Stein to be the most logical way. It is used mainly under suspension to get the best results. Most of Dr. Stein's work was done under the indirect method. So he would like to have Dr. Good give some details as to how often used and the method employed.

DR. C. H. LONG has had some experience with fulguration, but his trouble has been that he could not continue it long enough at any one time. He could not continue it for fifteen minutes, even under cocain anesthesia, and the results were negative.

With regard to the Yankauer operation for dacryocystitis, he would like to ask Dr. Good how this operation differs from the West operation. West spent a good deal of time in developing a sac operation, which has quite a considerable technic connected with it. The speaker has done it on a dead subject several times, and his impression was that any opening near the anterior end of the middle turbinate that was made large enough would give an excellent drainage to the sac and cure the patient, as the opening most always closes. He did not see why it was necessary to have such an elaborate technic as Dr. West explained. The West operation was brought out principally for those cases that were not cured by extirpation of the sac, and drainage through the nose looks very simple. The principal objection to this operation is that the nasal opening closes and the patients are liable to a reinfection.

DR. ROBERT SONNENSCHEIN had had occasion to see the first patient at the County Hospital, but did not operate her. At the present time there is a decided change in the larynx as compared with what it was at that time. He had seen Drs. Beck and Friedberg attempt to remove the papilloma by the suspension method, but that day the patient did not tolerate the method very well, despite cocainization, and nothing was

accomplished. However, a few days later she was operated, but Dr. Sonnenschein was not present. Just how much of the growth was removed at that time he did not know, but when he saw her the right cord was enormously thickened. It was not a papilloma with a pedicle, but a sessile, very broad-based tumor. At that time the girl was aphonic, and if fulguration did it, it was certainly wonderful. However, the speaker did not know how much of the growth was removed at the second suspension operation.

Dr. Otis H. Maclay said, with reference to the West and Yankauer operations, that he had done the West a couple of times. While either one may bring about a result, it seems to him that the one that produces the least traumatism to the nose should be chosen, making a small opening rather than a long incision. The cases he had operated apparently gave good results. They were both pus sacs.

Dr. Good, in closing the discussion, said he thought he had given seven treatments of fulguration, about ten minutes for each treatment. He was sorry he had used both the sesquichlorid of iron and the fulguration, because it left him in the dark as to which did the business.

As to the technic of fulguration, it is a very ordinary affair. There is a little platinum wire, or any wire, with a rubber cuff over the wire, which comes within a fourth of an inch of the tip of the wire. This is fastened onto a handle. The tube is bent and put into a handle, which goes down into the larynx. The patient holds the electrode in the hand. The fulguration handle has no connection at all. In the method Dr. Good uses you draw the electricity out of the patient, and therefore it is not necessary to have the field all dry, as in the Yankauer method.

Dr. Stein asked if Dr. Good has tried the method in any other cases.

Dr. Good replied that this was the first case.

Dr. H. Kahn asked if he noticed any reaction following the treatment.

Dr. Good replied that he did not notice much reaction—perhaps a little less hyperemia.

Regarding the West operation, the speaker did not agree that

all West operations mean cures. The patient is not suffering from the loss of the anterior end of the turbinate. Personally, he would rather have the two combined done on him to make more certain of good results.

Specimen of Carcinoma of the Pharynx and Esophagus, With Secondary Involvement of the Cervical Lymph Nodes.

DR. G. M. MCBEAN presented this specimen, supplementary to the remarks he had made at a meeting a couple of months ago, in the discussion of Dr. Norcross' paper on carcinoma of the pharynx. These remarks concerned a woman, forty-three years of age, whose condition had been diagnosed as tuberculosis of the larynx, pharyngitis, rheumatism, and almost everything else but the right thing. She had been having tuberculin treatments and treatment with vaccines; also large doses of aspirin. She had had a ventrofixation of the uterus done for pains in the throat, and a hysterectomy also. She had been urged to have her tonsils removed. The speaker could not remember all the things that were done. Since he had referred to the case two months before, the patient had died, and he had brought the specimen for the members to see.

The condition presented was a very rare one, being a carcinoma of the upper third of the esophagus. Carcinomas of the esophagus are usually in the lower end. It is also a rare condition in a woman of forty-three. The arytenoids were very markedly involved, but when the speaker had first seen the patient in March they were not involved. The vocal cords were at no time involved in any way, but the last few times the speaker saw her it was impossible to see into the larynx because of the immobility of the cartilage.

The postmortem examination was as follows: Only the organs of the oral cavity, neck and lungs were examined. Tongue apparently normal. Soft and hard palates and uvula normal, only somewhat paler than normal. Thyroid slightly enlarged, very pale, but free of macroscopic alterations. After opening the trachea anteriorly in the median line, there are several protuberances visible in the posterior wall. They form irregular nodular growths, which are still covered by the mucous membrane. They greatly diminish the lumen of the pharynx and

of the upper one-third of the trachea. Through these nodular growths the vocal cords are partly obliterated and drawn to each other. There is no ulceration visible in larynx and trachea. The glottis and epiglottis are unaltered. After opening the pharynx and esophagus posteriorly in the median line, a large ulcerated neoplasm becomes visible. It encircles the entire esophageal tube, its upper border corresponding with the lower end of the epiglottis and extending downward for thirteen centimeters. The ulceration is surrounded irregularly by thick, indurated border. The surface of the ulcer is covered with foul-smelling necrotic, slightly hemorrhagic masses. The ulcer presents several nodular protuberances, varying in size up to a large cherry. These nodular masses are soft, of medullary consistence, obstructing entirely the tube. Below this neoplasm the mucous membrane of the esophagus is very pale. There is a chain of enlarged and somewhat indurated cervical lymph nodes visible on both sides, the nodes varying in size up to a lima bean. There is on each side one old string-like fibrous adhesion between both pleuræ, on the right side on the lower border of the middle lobe, and on the left side on the lower border of the upper lobe. Both lungs are larger and heavier than normal; especially the lower lobes are highly congested. The bronchi contain large quantities of a serofibrinous exudate, and in each lower lobe, centrally located, there is one rounded area, the size of a pigeon's egg, of reddish gray consolidation. The mediastinal and bronchial lymph nodes are unchanged. There is nowhere in the larynx, pharynx, trachea, esophagus, lymph nodes, or lungs the slightest evidence of fresh or old, or even healed, tuberculosis. The diagnosis made from post-mortem examination was: Carcinoma of the pharynx and esophagus; secondary carcinoma of the cervical lymph nodes; old fibrous pleural adhesions; bilateral localized inhalation bronchopneumonia.

Paper: Remarks About the Development of the Diagnosis and Treatment of Sinus Thrombosis.*

By J. Holinger, M. D.

DISCUSSION.

Dr. Norval H. Pierce did not think such a radical view of the matter should pass undiscussed. It seemed to him to mark a distinctly retrograde step in our ideas regarding the treatment of sinus thrombosis. It is against the general law of surgery, namely, where you find pus you should drain. There is no doubt but what a great many more sinus thromboses recover without operation than we have any idea of, but once there is a septic thrombus detected within the sinus, whether it is parietal or a floating thrombus, or whether it is an obturative thrombus, his opinion is that it should be removed, the same as a septic thrombus in a large vein or in any other accessible part of the body. If we do not do this, if we simply lay bare the sinus, and the patient recovers, he does not recover from our operative skill, but by the grace of good fortune.

The method described by Dr. Holinger has been tried, but not extensively, so far as Dr. Pierce knew. Its use has been limited to a very few men. It does not represent the modern idea of the subject by any means. These investigations on animals count for very little, Dr. Pierce thinks, as they are produced on healthy animals, and these thrombi in people, especially in the chronic forms, occur in people more or less reduced in vitality by the whole suppurative process.

Regarding the advisability of ligating the jugular in every case, that would bear a good deal of discussion. Some operators are very radical in the matter, believing that all cases should be ligated before opening the lateral sinus, to prevent the forcing of thrombi into the general circulation during the necessary manipulation of the sinus. Dr. Pierce does not agree with these men, but believes, however, that there is a distinct indication for ligating the jugular—not only ligating the jugular, but dissecting out a given piece of the jugular between the upper and lower ligatures. In this way we can to the best of

*See page 985.

our ability cut off the original source of the infection, because a thrombus occurs primarily from an infection of the blood vessel walls themselves, and the infection spreads beyond the thrombus in the vessel walls. He was reminded of a recent fatal case of thrombosis of the sigmoid sinus, where a piece of vein was removed well down to the calvicle. There was no thrombus here. The thrombus was away up just above the facial, and ceased there apparently, and yet there were micro-organisms in the blood vessel wall itself.

Dr. Pierce could not see how the condition of endothelium of the intima of the inner wall of the sinus has very much practical bearing on these cases. Whenever a sinus is infected at all, this is pretty well destroyed. Its usefulness as a protective agent against the spread of the thrombus is at least rendered inactive. That is the main point upon which Dr. Holinger bases his thesis; that in order to prevent a thrombus from forming we should not disturb by our manipulative procedures the inner wall of the sigmoid sinus. When that has become thrombosed this point loses its value, it seems to Dr. Pierce.

The speaker's mode of procedure is in cases of sigmoid thrombosis to get free bleeding from both the upper and lower portion of the sigmoid sinus, if possible. If he fails in the lower portion, he does not necessarily proceed immediately, at the same operation, to ligate the jugular, unless the picture has been one of very grave pyemia before. In that case he would immediately proceed to the ligation and resection of the jugular, but after a day or so, if he finds that the sinus is still leaking pus into the general circulation, which is shown by the septic curve of the temperature, the occurrence of septic emboli, and general condition of the patient, then the jugular is ligated. However, at the time of the first operation, if the leucocyte count is high, and there is marked sepsis, the general condition of the patient impressing one with the fact that the patient is very ill, or septic infarcts are occurring, then he would immediately proceed to ligation of the jugular. If the case is not of this type, however, he might wait a day longer.

The best we can do in these cases is to establish in that sinus a nonseptic thrombus, by whatever means of operating we adopt, and it may be that if we have removed the greater por-

tion of the offense, even if we do not get bleeding from below, there may be established a nonseptic thrombus at the lower end in the direction of the jugular bulb. But there is no doubt, from his experience, that if this does not prove to be a nonseptic thrombus at the lower end, the advisability of tying the jugular is proven by practical experience.

Dr. Pierce would like to know how many cases of septic thrombosis of the sigmoid or lateral sinus Dr. Holinger has seen and treated by the method described, and what his percentage of recovery is.

Dr. George W. Boot, since the first of last December, has operated on fifty-one mastoids, six of which had sinus thrombosis. Three of the sinus thrombosis cases died, all because they were not operated in time. One was a case of a type which the speaker imagined Dr. Holinger referred to. The boy had a metastasis in the great toe and a septic endocarditis. He died on the operating table. The other two cases had meningitis, as postmortem examination showed.

Dr. Boot believes that in these cases of sinus thrombosis, where you have a septic thrombus, as shown by the temperature curve, the sinus should not only be opened, but the jugular should be ligated. To do otherwise is to lock your stable door after the horse is stolen. The object of operation is to prevent the entrance of further infection into the system. These cases almost invariably have blood clots in the sinus, and in the majority of cases the organism causing the sinus thrombosis is the streptococcus. It is not a good idea to have too many streptococci loose in the system. They may cause trouble. The greater the number you keep from getting into the circulation, the more good you are doing the patient. He believes that in all these cases where there is a septic thrombosis the vein should be ligated. He was reminded of a case of a young man who had a mastoid operation; later he developed symptoms of sinus thrombosis; the sinus was opened and the pus evacuated; bleeding was secured from the upper and not from the lower end. Symptoms of septicemia continued. Finally, the speaker exposed the jugular to ligate it. He found it full of pus—three drams being evacuated from the jugular vein. The pus had extended so far down that he could not get below to ligate, and had to content himself with sim-

ply draining the jugular vein. The patient recovered after having a large abscess over the left trochanter major.

Dr. Boot passed around a number of temperature charts of sinus thrombosis cases. One case ran from early in January until perhaps about the end of April before being discharged finally. In another case, where the sinus was opened, drained and the jugular vein not ligated, the symptoms continued for several days after the first operation. Then the jugular was exposed and found filled with an organized thrombus. Another case was a woman who had been operated on by an otologist in New York City, who did a mastoid operation on her. She came back to Evanston with the wound not quite healed and came to the speaker for dressings. He dressed it. The next day she had a sharp chill, with a temperature of 103.6° F. There were no other symptoms evident. It looked as though she were developing a sinus thrombosis. It turned out to be a case of erysipelas. Another case illustrated the course of mastoid operation in scarlet fever. The chart showed very irregular temperature.

Dr. H. Kahn asked Dr. Holinger if he had understood him to say that the swelling of the eyelid was a symptom of late sinus thrombosis.

About a year ago there came to the speaker's notice and into his service a woman with a neglected mastoid. She was operated, and the sinus accidentally wounded. He packed it with gauze in the orthodox way. In the course of a week, one evening his attention was called to the swelling of the face, and a swelling of the eyelid, on the side of the mastoid operation. In the course of an hour or so a chill occurred, which recurred the next day. The wound was reopened, and the sinus was found thrombosed. Bleeding was secured from both sides, the wound packed; and she was treated in the usual method, and the patient recovered. This is in direct contradiction to the fact, stated by Dr. Holinger, that swelling or edema of the eyelid and swelling of the face is a symptom of late thrombosis. The speaker saw this symptom develop under his eyes.

Dr. Joseph C. Beck wished to speak from the few years' experience he had had with these cases. First, as to his observation when abroad, training under Zaufal and Piffl, who argued very much in favor of ligation, as most men are doing

at the present day. On the other hand, Kaufmann, with a larger material, follows the method mentioned by Dr. Holinger, a method followed by many abroad even to this day, and he claims to have the best results. He could remember eight cases distinctly, five of Kaufmann's, on the Bohemian side, and three of Zaufal's, on the German side of the clinic, that were not ligated and recovered.

When Dr. Beck first came back he operated in a conservative way on these sinus cases, with not a very good result. But latterly he has been ligating, opening the sinus, and packing off the torcular region, and going down towards the bulb, being insistent on getting the bleeding from below, as near the jugular bulb as he possibly can. Then, if he does not get bleeding, he ligates the jugular, not necessarily resecting, unless there are distinct evidences of a thrombosed vein. As a means of prevention, he can see nothing better than that. Ligation is very easily done, and it is a safe procedure, which the speaker practices with excellent results.

As to the remarks regarding swelling of the face, we see that very frequently from the cutting of the temporal vein following ordinary mastoid operations.

Dr. Kahn's remarks reminded him of two cases he had had during the last six months, in which he had accidentally wounded the sinus. He was in great trepidation that something was going to happen, because he did not do anything to the sinus except cover it up. However, nothing happened in one case. In the other, however, there was a general multiple arthritis with symptoms of a septic process, but the patient recovered without any impairment to the joints. He did not know whether that was purely a toxic condition from the wounding of the sinus, or the sepsis already existing in the blood. He did not make any blood cultures previous to operation in this case.

DR. HOLINGER, closing the discussion, said it was entirely sufficient for him that he had put an idea in the minds of the members, and he knew where they would land.

As to Dr. Kahn's question, Dr. Beck had answered it already. Swelling of the face and swelling of the eyelids are not identical. In the late course of the disease the swelling of the eyelid indicates a blocking of the sinuses on the base of the brain

and of the veins which drain the blood from the orbit and eyelid. It is a different proposition from a swelling of the face.

Dr. Beck had said that he saw Professor Zaufal practice the method described in the paper. That is true. Dr. Holinger has operated for more than ten years according to it, but the experimental proof dates only since the last few years. He gave the abstracts of the papers which contained reports of the fundamental experiments. They contain points which you cannot evade. If experiments show that as soon as we remove the septic material from around a sinus the sinus is able, if not otherwise injured, to take care of the septic material within it, what more do you want? The indications which we must follow are: Remove all the septic material from around the sinus, and otherwise leave the sinus alone. Do not handle it. Do not puncture it. Do not work any more than is absolutely necessary, because of the danger of secondary thrombophlebitis. According to postmortems, this is one of the occurrences that has killed many patients after otherwise successful operations for sinus thrombosis. Experiments have shown that new thrombi in sinuses where septic thrombi have been before are, of course, infected. New thrombi, therefore, have to be avoided under all circumstances. It is not a step backward to limit and simplify an operation. The method described is easier, simpler and much safer.

One more important point must not be forgotten, namely, we have now better means of diagnosis, by leaving out all other points and relying alone on temperature and septic attacks.

We formerly had many of the late cases to deal with. The late, chronic cases have to be handled differently from those developing in connection with acute suppurations of the middle ear, where we are in a position to make a comparatively early diagnosis, and therefore can operate much earlier. Dr. Holinger does not, under all circumstances, object to the ligation of the jugular vein, but he does not think it is indicated in sinus thrombosis occurring in fresh acute suppurations of the middle ear. It is the latter which he is considering, and not the cases developing in connection with old cholesteatoma. He came to the conclusion that regular temperatures must be taken in every case of acute suppuration of the middle ear. In this way he discovered several acute cases during the last

spring. After operation there are again rises of temperature, but at no time is there any question whether or not the patient is going to recover.

As the speaker had said in his paper, he did not expect the members to take his word from the start, but he wished to impress on them the fact that it is worth while to follow up the literature on the question. The operation is infinitely simpler and quicker, and if you have ninety-two per cent of recoveries, as Scheibe has with this operation, that seems a pretty good record.

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VOL. XXV. DECEMBER, 1916 No. 4

Annals of Otology, Rhinology and Laryngology

FOUNDED BY JAMES PLEASANT PARKER

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PUBLISHED QUARTERLY
BY JONES H. PARKER,
MERMOD-JACCARD BUILDING,
ST. LOUIS, MO., U. S. A.

SUBSCRIPTION PRICE, $4.00 PER ANNUM, IN ADVANCE.
Subscriptions in other countries of the Postal Union, 18 shillings.
ANNALS OF OPHTHALMOLOGY, $4.00

Entered at the Postoffice at St. Louis, Mo., as Second-class Matter.

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